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TRACES OF ANCIENT GLACIERS IN THE WHITE  
MOUNTAINS OF NEW HAMPSHIRE.

BY GEORGE L. VOSE.



PROBABLY few of the tourists who ride up the valley of the Androscoggin, from Bethel to Gorham, upon a hot August afternoon, would be quite prepared to believe that at some former period a solid river of ice filled that valley, for hundreds of feet in depth, and many miles in length, moving with a slow but irresistible march downwards, and that this huge glacier was continually supplied with fresh material at its upper end, from the vast snow-fields beneath which the White Mountains were perpetually buried. Yet there is evidence upon the ground that such was the case. All along the route the rocks are carved with hieroglyphics, more ancient by far than those of Egypt and the Nile, which, by means of the key obtained in the Alps, we are enabled to read.

In the mountains of Switzerland and of Italy, immense bodies of snow accumulate in the more elevated regions, where it is so cold that melting to any considerable extent is impossible, even in the summer. This snow is by a very gradual process converted into ice, immense bodies of which fill the higher Alpine valleys, and, urged by the pressure of

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the unconsolidated snow at the upper part of the mass, move down at the rate of from three hundred to five hundred feet in a year. The moving of a mass of ice, it may be a dozen miles in length, a mile wide, and a thousand feet deep, is attended by a tremendous grinding upon the rocks over which the glacier passes. By extended examinations geologists have become convinced that in old times these great bodies of ice covered immense tracts where now no ice is seen, and nothing but the polishing and scratching upon the ledges remains. This furrowing and polishing resembles so exactly the results now being produced beneath the present glaciers of the Alps, as to be regarded as positive evidence of the movement in a former age of vast bodies of ice over the rocks so scored.

There is at first sight a marked difference between the glacial furrows and polishing in the Old World and in the New. In Europe these marks upon the rocks are found in certain mountain regions, and always referring us by their direction to the higher parts of the mountain groups; thus showing that the glaciers moved down from the higher to the lower lands. This is plainly seen in the Alps, in Scandinavia, and Great Britain. In America, the traces upon the rocks, as a general thing, appear to have been produced by a far more wide-spread operation, inasmuch as the furrows have a prevailing southerly direction, regardless of topographical features to a remarkable extent, as they pass directly over and across some of the largest ranges of mountains. Throughout New England, the most common course of the furrows is about s.s.e. The wide extent of these traces would seem to point to some very general operation as a cause. What this operation was, or rather precisely how it worked, is by no means yet understood by geologists; nor does it concern us here, as the object at present is to call attention to a different class of glacial traces, which appear to show, contrary to the opinion for a long time held, that besides this general operation, which may be

traced over so wide an area, there have been what may be termed local glaciers,—masses of ice which belonged especially to certain mountain groups, and moved down the large valleys, leaving marks upon the rocks over which they passed, according in direction with the course of the valleys, and varying widely from that of the prevailing north and south traces.

The White Mountains of New Hampshire, both from their height and their northern latitude, give us reason to suppose that if local glaciers ever existed in New England, their traces would be found in the valleys of this group. The late Dr. Edward Hitchcock predicted that such would be the case. Dr. A. S. Packard, of Salem, after an examination of the eastern slope of the White Mountains, concluded that glaciers had, during some former period, radiated from the higher summits. The reader is particularly referred to his article in the first volume of this Magazine, as the glacial traces there referred to are laid down upon the map accompanying this paper, and as a section of the mountains but little known is there described.

It is to a part of the Androscoggin Valley, and to the upper part of its tributary, the Peabody River, that attention is here called, as facts plainly seen upon the ground seem to show that a glacier moved from Mount Washington down to the point where Gorham now stands, and that it joined at that place another large glacier, moving down the Androscoggin almost twenty miles, to Bethel.

The general course of the Androscoggin River, from its source to its mouth, is south-east; but this general course is made up of local courses which differ widely in direction. From its junction with the Megalloway, west of Umbagog Lake, to Gorham, thirty miles, it flows from north to south; from Gorham to Bethel, twenty miles, it flows from west to east; at Bethel it turns abruptly round and flows for six miles north, and from the point thus reached east for thirty miles, but with great local variations; thence thirty miles

south to Lewiston, and from that place twenty-five miles south-east, through Lisbon and Brunswick, to its junction with the Kennebec above Bath.

Now, while the glacial traces in the north and south reaches of this river might have been made either by the general operation which has polished off the whole country, or by a local glacier confined to the valley, such could hardly be the case with any furrows which may be found coinciding with the general direction of the east and west reaches. Let us look at the Androscoggin Valley, from Bethel in Maine, to Gorham in New Hampshire. This part of the river flows, for twenty miles, from west to east, and is bounded on both sides by abrupt hills from 1,000 to 2,000 feet high. At Bethel the valley opens, the hills receding and decreasing in elevation. Where glacial furrows are found upon the tops of the Bethel hills, they run nearly north and south. Proceeding up the valley towards Gorham, upon the south (right) bank, at a point about two and a half miles above Bethel, before we really enter the close valley, and perhaps a hundred feet above the level of the river, a small exposure of rock is seen directly in the common road, being about six feet square, with a long gently sloping polished surface towards the north, and a steep and rough face towards the south. The furrows upon the smooth northern surface run north and south, and the hills upon the summits of which the furrows run north and south, lie exactly north of this rock, upon the opposite side of the river. This furrowing had evidently no connection with the Androscoggin, as the grooves point almost directly across it. Continuing up the valley, just above Pleasant River, five miles above Bethel, about one-fourth of a mile south of the road, and perhaps two hundred feet above the river, the rocks are well polished; and from faint lines upon masses of quartz, the direction of the ice is seen to have been S. 50° E. Six miles above Bethel, where the river, railway, and road, draw closely together, and sweep round the base of Peaked Hill,

in Gilead, in the railroad cutting just between the two crossings of the common road, there is a steep ledge about twenty feet high, close to the track, which is polished and furrowed both upon the nearly vertical face towards the river, and also upon a narrow horizontal shelf part way up on the ledge. The lines upon the horizontal shelf run s.  $20^{\circ}$  E., the vertical face standing s.  $25^{\circ}$  to  $30^{\circ}$  E. It is necessary, however, to be guarded in drawing conclusions from glacial traces left upon vertical or steeply inclined surfaces; as the movement of ice, jamming through a narrow passage, may be locally disturbed, so as to give a direction to the furrows quite different from that of the general movement of the glacier. This was most likely the case at the point above referred to; as the furrows on the opposite side of the hill, *i. e.* the south side, run s.  $80^{\circ}$  E.; thus according much more nearly with the traces both above and below this point than the furrows upon the steep face towards the river do. The ice would seem to have passed around both sides of this hill; and we can readily conceive that this might be, since the depression in the rear, south of the elevation, is quite low. Indeed, in the fine view from "Sunset Rock," in Bethel, looking up the Androscoggin, Peaked Hill seems to rise in a very isolated manner from the middle of the valley, which makes it a very prominent feature in that magnificent picture.

Continuing up towards Gilead, about a mile above Peaked Hill, and eight miles from Bethel, at a point where the mountains crowd in close upon the river, there occurs a little south of the road, and it may be three hundred feet above the river, a large, steeply inclined, and magnificently polished surface, which is very plainly seen from the road a mile and a half below, as it sweeps around the western base of Peaked Hill. This surface shows a very few faint lines; but just below it may be seen well-defined furrows upon quartz, running s.  $55^{\circ}$  to  $60^{\circ}$  E. At a little more than nine miles from Bethel, upon the side of the common road, where

it bends again around a mountain spur, furrows are seen upon a small exposure running s.  $80^{\circ}$  E. At Gilead, ten miles from Bethel, just north of the railroad woodshed, and near the Androscoggin River, furrows are seen upon a highly polished surface of quartz, running s.  $40^{\circ}$  E., and a few rods east of this ledge, are some very good examples of erratic blocks; though from their lithological character they have apparently not come from any great distance. Between the railroad station and the old Wild River bridge, may be seen a good example of a polished rock, with a long, smooth, gentle slope to the north-west, and a rough, short, broken face to the south-east; but lacking indications of the precise direction of the movement of the polishing agent. About a mile above Gilead station, at the base of Mount Ephraim, where the road and the railroad draw close together and bend around the mountain, just south of and close to the road, at a small quarry, are well-marked lines in quartz, running s.  $70^{\circ}$  E.

The several traces above referred to, may be seen by reference to the map, in the positions which they occupy in respect to the course of the river. They follow the general direction of the Androscoggin Valley at this place, and are nearly at right angles with the course laid down by Dr. Packard upon the summit of Speckled Mountain (5). The remaining part of the valley, from Gilead through Shelburne to Gorham, as well as the whole reach from Gorham to Bethel upon the northern bank, invites examination; additional traces will doubtless be found, supporting the conclusion that a large glacier once moved down this portion of the Androscoggin. Especially interesting seem to be the isolated Peaked Hill (3), and the abrupt and inviting summits of Mount Ephraim, just above Wild River (4); and should no glacial traces reward the time spent in examining these points, the explorer would be amply repaid for his labor by the superb panorama which he will see spread out beneath him.

Mount Hayes, which rises about 1,200 feet above the village of Gorham, and thus 2,000 above the sea, shows upon its summit furrows running s.  $40^{\circ}$  E. This elevation affords an excellent view of portions of the Androscoggin and Peabody Valleys, and gives a more correct idea of the general relief of the surface in that region than can be obtained elsewhere. The towering pyramids of Madison and Adams are also seen from this point to great advantage, and, altogether, Mount Hayes offers every inducement to those fond of an active tramp and fine scenery.

The Peabody River rises upon the eastern slopes of Madison, Adams, Jefferson, Clay, and Washington, and upon the western slopes of the opposite range of the Carter Mountains, the Imp, and Mount Moriah; and flows about N. N. E. to Gorham, where it joins the Androscoggin. The surface geology of this valley is exceedingly interesting; it has been carefully studied by Dr. Packard, and, from the arrangement of its terraces and the other forms of the unconsolidated material, he concluded that a large glacier once occupied this valley, extending as far down as to Gorham. His conclusion is somewhat confirmed by the following facts: About one hundred and fifty yards north of the Glen House, just south of a large boulder upon the west side of the road, the surface has been cut open, and has exposed a portion of a ledge, perhaps a dozen feet in length and a yard wide, on which, at right angles to the contorted lamination of the rock, faint lines, or rather furrows, are seen running N.  $35^{\circ}$  E., or S.  $35^{\circ}$  W. This ledge was covered several feet deep by the material of the terrace in front of the Glen House. Just across the valley from the hotel, where the carriage road commences to ascend, the upper part of the large exposure on the right hand is well polished and furrowed, in a south-west direction. Half a mile farther up the road, furrows upon the right side, close to the road, are seen running S.  $40^{\circ}$  W., or N.  $40^{\circ}$  E., and again a short distance above the path leading to Tuckerman's Ravine, upon a surface

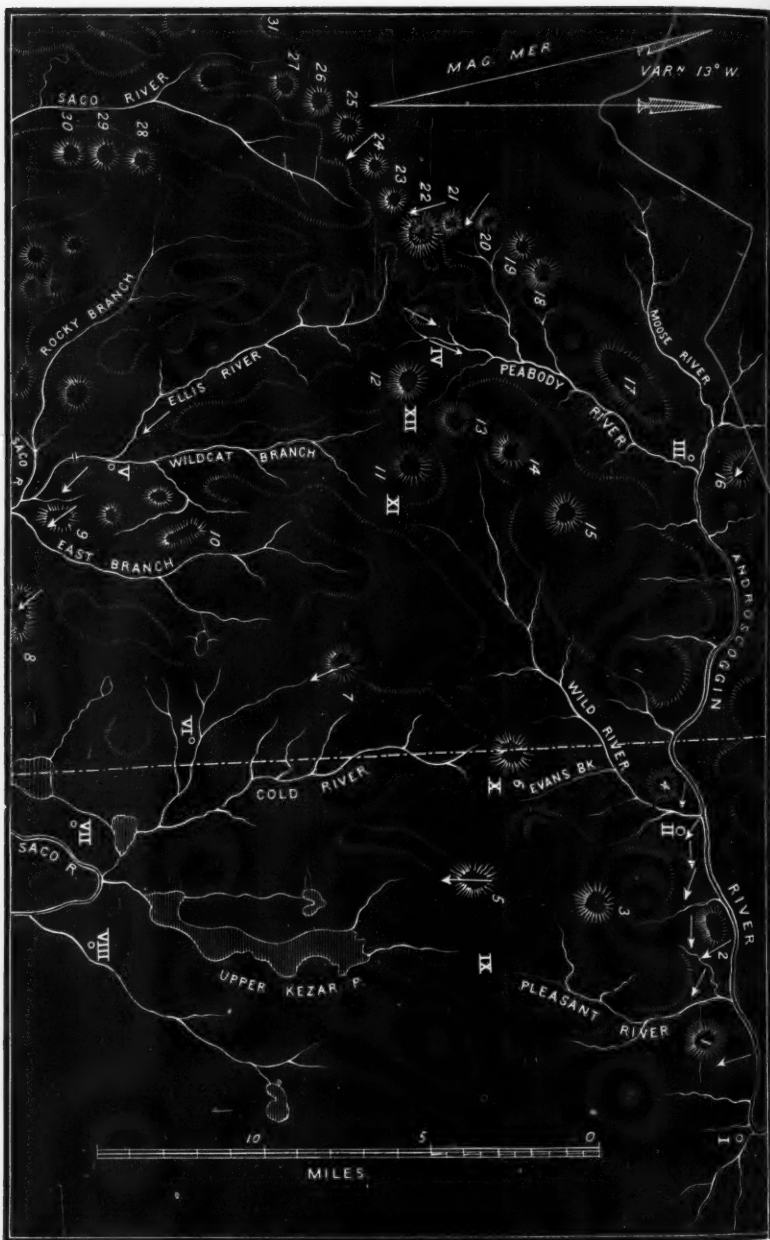
somewhat inclined towards the road, may be seen lines running s.  $30^{\circ}$  w., or n.  $30^{\circ}$  e. Many more traces would doubtless be found in this neighborhood if sought for with care; as the few recorded were noted without stepping out of the common road.

Thus it appears that while the glacial furrows in the Androscoggin Valley have courses ranging from s.  $20^{\circ}$  e. to s.  $80^{\circ}$  e., those of the upper part of the Peabody Valley range from s.  $30^{\circ}$  w. to s.  $40^{\circ}$  w.; making a general difference between the courses in the two valleys of over  $80^{\circ}$ ; a difference equal to that between the two valleys themselves. We may, it would seem, thus conclude that a large glacier moved from the neighborhood of Mount Washington down towards Gorham; and that another moved from Gorham down the Androscoggin Valley, at least as far as to West Bethel.

In the depression between the higher summits of the White Mountains, especially between Clay and Jefferson, Munroe and Washington, and at the foot of Mount Franklin, the rocks are rounded and polished from the north and north-west. A little above the Lake of the Clouds, directly in the Crawford bridle-path, faintly defined furrows may be seen running nearly north and south; this point would be about 5,300 feet above the sea, according to the measurements of Professor Guyot. These elevated traces belong, not to any local glaciers, but to the general ice movement which swept over the whole of New England.

The White Mountains have been so scarred and torn by slides, the valleys so filled with rubbish, and the beds of the streams so excessively water-worn, that many of the glacial traces have most likely disappeared. Still, this region has been very little explored, and has yielded as much fruit perhaps, for the cultivation bestowed upon it, as any other. That part of the Saco Valley between Old Crawford's and Bartlett, and the parallel valley of Swift River, which drains a large area between Chocorua and the Mote Mountains, and

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enters the Saco at Conway Corner, both running nearly from west to east, deserve to be carefully studied. The valley of Wild River, too, promises to afford traces of local glaciers whenever it shall be carefully explored.

We have called attention to the few facts which we have noticed in the eastern section of the White Mountains. We do not propose to theorize upon the relation between the general and the local traces at present. We prefer to await the farther accumulation of evidence which shall enable us to restore correctly the various phases of that cold period when vast snowfields filled the White Mountain basins, and huge glaciers ploughed along the White Mountain valleys, leaving those marks upon the rocks by which we judge of their former presence, those convincing illustrations upon the last page of the geological history of the globe.

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DESCRIPTION OF THE MAP.

The district embraced by the accompanying map extends from Bartlett and Kearsarge on the south, to Gorham and Mount Hayes on the north; and from Bethel, in Maine, upon the east, to the White Mountain Notch on the west. It thus includes what may be termed the eastern slope of the central mass of the White Mountain group. This general eastern slope, it will be seen by a glance at the several streams, has an irregular water-shed, running from the Pinkham Notch a little north of east for about twenty miles, and afterwards running still more north of east so as to pass a little south of Bethel. Besides the Pinkham Notch, there are four passages across this water-shed; all accessible to those who are not afraid of a little rough walking, and all full of interest to lovers of wild natural scenery. The route from Jackson to Gorham, by the Pinkham Notch and the Glen, is familiar to all; but there is another mode of passing from Jackson into the Peabody Valley which few persons have tried. This is the route up the Wilcat Branch to its western source, in the Carter Notch (xii), and thence down the stream flowing north, out of the same notch, to its junction with the Peabody River, a short distance below the Glen House.

The second passage of the water-shed is made by following up the eastern source of the Wilcat Branch, and passing through the depression (xi) and striking the head of the Wild River; this may be followed to its junction with the Androscoggin at Gilead. This trip requires two days; and in starting from Jackson, the camp for the night should be well over into the Wild River Valley: otherwise the second day's journey will be

too long, as much of it must be made in the bed of the stream, at least as far as to the State line, after which there is a good foot-road down the right bank to Gilead.

The third passage is the one described by Dr. Packard, in the first volume of this Magazine, p. 265-267, from Chatham up the Cold River to Gilead. Chatham may be reached by crossing over the mountains from Jackson (v), or by going north from Lovell (viii) or North Fryeburg (vii).

The fourth passage is from Lovell up either side of Kezar Pond, through Miles' Notch (ix), and thence by Pleasant River to West Bethel on the Androscoggin.

The Roman numerals upon the map indicate the following points: i. Bethel; ii. Gilead; iii. Gorham; iv. The Glen House; v. Jackson; vi. Chatham; vii. North Fryeburg; viii. Lovell; ix. Miles' Notch; x. Evans' Notch; xi. Wild River Notch; xii. Carter Notch. The additional figures serve to define the following separate mountains: 1. Sparrow Hawk, in West Bethel; 2. Peaked Hill, in Gilead; 3. Calabo, in Mason; 4. Mount Ephraim, in Gilead; 5. Speckled Mountain, in Stoneham; 6. Mount Royce, 7. Baldface, both in Chatham; 8. Kearsarge, in Chatham and Bartlett; 9. Thorn Mountain, in Bartlett and Jackson; 10. Double-head, in Jackson; 11. Name unknown; 12. Wildcat; 13. South peak of Carter; 14. North peak of Carter, or Imp; 15. Moriah: these five last-named mountains are in the tract between Jackson and Shelburne, called Bean's Purchase; 16. Mount Hayes; 17. Camel's Hump, in Gorham; 18. Madison; 19. Adams; 20. Jefferson; 21. Clay; 22. Washington; 23. Munroe; 24. Franklin; 25. Pleasant; 26. Clinton; 27. Jackson; 28. Giant's Stairs; 29. Mount Resolution; 30. Mount Crawford, and 31. Mount Willard. The fourteen peaks last named lie in land granted to individuals, but never made into townships. Mount Crawford, Resolution, and Giant's Stairs lie in the old route, now abandoned, from old Crawford's to the summit of Mount Washington, joining the present Crawford bridle-path east of Mount Munroe.

The following figures show the elevation above the sea of some of the principal points upon the map, according to the barometrical measurements of Professor Guyot:

Androscoggin River, at Bethel, Me., . . . . .	632 ft.
Railroad Station, at Gorham, N. H., . . . . .	802
Glen House, . . . . .	1,632
Peabody River, opposite Glen House, . . . . .	1,543
Summit of road, Pinkham Notch, near Glen Ellis' Falls, . . . . .	2,018
Hotel at Jackson, . . . . .	771
Road at Junction of Saco and Ellis Rivers, . . . . .	576
Old Crawford's (Davis'), . . . . .	986
Wiley House, White Mountain Notch, . . . . .	1,335
Crawford House, White Mountain Notch, . . . . .	1,920
Mount Clinton (26 on map), . . . . .	4,320
Gap between Clinton and Pleasant, . . . . .	4,050
Mount Pleasant (25 on map), . . . . .	4,764

Gap between Pleasant and Franklin, . . . . .	4,400 ft.
Mount Franklin (24 on map), . . . . .	4,904
Mount Munroe (23 on map), . . . . .	5,384
Gap between Munroe and Washington, . . . . .	5,100
Lake of the Clouds, foot of Munroe, . . . . .	5,009
Mount Washington (22 on map), . . . . .	6,288
Gap between Washington and Clay, . . . . .	5,417
Mount Clay (21 on map), . . . . .	5,553
Gap between Clay and Jefferson, . . . . .	4,979
Mount Jefferson (20 on map), . . . . .	5,714
Gap between Jefferson and Adams, . . . . .	4,939
Mount Adams (19 on map), . . . . .	5,794
Gap between Adams and Madison, . . . . .	4,912
Mount Madison (18 on map), . . . . .	5,365
Limit of trees on north side of Washington, and on Madison, . . . . .	4,150
Limit of trees on Clinton, . . . . .	4,250
Mount Hayes (approximate) (16 on map), . . . . .	2,000
Mount Moriah (15 on map), . . . . .	4,653
Carter Mountain, north peak, or Imp (14 on map), . . . . .	4,702
Carter Mountain, south peak (13 on map), . . . . .	4,830
Wildcat Mountain (12 on map), . . . . .	4,350
Double-head, north peak } (10 on map), . . . . .	{ 3,100
Double-head, south peak }	{ 3,000
Kearsarge (8 on map), . . . . .	3,500
Thorn Mountain (9 on map), . . . . .	2,500
Giant's Stairs (28 on map), . . . . .	3,500
Mount Resolution (29 on map), . . . . .	3,400
Mount Crawford (30 on map), . . . . .	3,134
Mount Jackson (27 on map), . . . . .	4,100
Mount Webster (south of 27), . . . . .	4,000

NOTE.—There are few persons among those who visit the Mountains who could not aid in obtaining evidence of former glaciers, if they were so disposed. A very little study will enable one to recognize the marks upon the rocks where they occur. A small compass and a piece of thread, the latter to be stretched along the furrow and over the centre of the compass, are the only things needed. Notes thus obtained, and recorded carefully and conscientiously upon the spot, are always valuable. In all cases the magnetic meridian should be used; and the correction for declination, according to the year and the location, applied afterwards: the use of two meridians in the field leads to confusion. The date, too, should always be affixed. It is well, also, to check the magnetic needle, for local disturbance, by taking the bearing to some known feature in the landscape when such exists; and where two points, the exact positions of which are known, can be seen, by taking the bearing of both of them, the place of the observer is easily determined; so that the point of his observation may be laid down upon the map. Glacial traces may be rubbed off from the stone itself, when it is somewhat smooth, in the same manner as children obtain the figure from a coin. Such impressions are often very satisfactory; being taken from Nature's own engraving. The meridian should be put upon the paper before it is moved from the stone in the above operation.

## MUSHROOMS.\*

BY JOHN L. RUSSELL.

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A PLEASANT little treatise on some of the more prominent species, and one well adapted to afford just such information as those who are not strictly botanists might need.

Some faint idea of the immense number of these obscure but interesting plants may be obtained from the title-page of the Rev. M. J. Berkeley's "Outlines of British Fungology, containing the characters of above a thousand species, and a complete list of all that have been described as natives of the British Isles." (London, 1860.) Of these 1,000 are large and conspicuous, and 1,406 are smaller and even minute, of which the species of *Sphaeria* alone which speck the leaves, and fruit of various plants in Great Britain, are 203 in number. In Fries' great work on the species of a single family, the Hymenomycetes, we find an enumeration and description of 2,545, embracing, for the most part, the larger kinds known to him in various regions of the globe. (*Epicrisis*. Upsalæ, 1836-38.) In the year 1831, Lewis D. de Schweinitz communicated to the American Philosophical Society, Philadelphia, a list of 3,043 species of fungi which came under his observation around Bethlehem, Pennsylvania. The list has been greatly enlarged since by the labors of Curtis, Ravenel, and other botanists in the Southern States, and by the collections of various individuals at the North.

The singularly varying forms, under which many of the Fungi appear, have given rise to species which farther research has reduced to some previously described. Abroad, the researches of the Tulasnes are elucidating this branch of the subject, and exhibiting most interesting details, and new as well as novel fields of investigation await the Ameri-

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\* A Plain and Easy Account of the British Fungi, etc., etc. By M. C. Cooke. With twenty-four colored plates. 12mo, pp. 148. London, 1862.

can botanist who will reduce to practical results a series of observations requiring a lifetime to acquire.

In view of the extent of our subject, the treatise before us can be regarded as no more than a brief and meagre account of some of the few and more prominent species which might occur to a beginner in such districts of England as are fertile in species. But it is to be regretted that the American press is not as generous in contributions to knowledge in the various departments of natural history as is that of the mother country. Just such a cheap and prettily illustrated treatise, which should be strictly American, would do a great service, and would be what many young persons need. There seems no good reason why the fantastic and gorgeous creations of the fungi, which deck our woods and spring up around our dwellings, or are found in our pastures, should not be studied and as well known to the young, as are the blue flowers of the *Hepatica*, or the rosy corols of the *May-flower*, or the first *Violets* and the *Saxifrage* and *Columbines*, which annually awaken a vernal zeal for botany, but which faints and fades away on the coming heats of *June*, or the sultry days of *August*. Who has not admired the *Agaries* and *Boleti* and *Clavarias* in the pine woods in *September*, and who has not longed to know something more of them, to learn their names, their good or bad qualities, their uses or ends? The brilliant scarlet disk of a *Peziza*, starting into life from beneath the dead leaves of a *Pennsylvania* wood, takes me back now to the vicinity of *Pittsburgh*, where years ago I searched for the *Erigenia*, the first blossom of the spring there; and there is no autumn which does not thrill me with a new life as I see the shady paths and the wet spots of *Cat Swamp* so bravely adorned with these fugitive and fugacious forms of vegetation.

The excitement which spurs on many a student in natural history, that he may be the possible finder of a *new* species, is coincident with the study of the fungi. Spots most familiar to the eye, often are found producing kinds either

quite novel, or at least of occasional occurrence. Dependent as it would seem on some atmospherical conditions, species of fungi are meteoric, and visit places which seem quite singular and remarkable. Some extraordinary specimens of the exquisite Morel (*Morchella esculenta*) were found in the coal cinders in the rear of the Eastern Railroad depot, by the late Mr. Knights, a worthy employee there. Occasionally I have seen it in old orchards, but should scarcely have supposed it the product of cinders. The beautiful *Cyclomyces* was first discovered many years ago in Tewksbury, in this State, by Dr. B. D. Greene, and found to be entirely unknown before, though subsequently occurring elsewhere. I look for the possibility of the appearance of the truffle in some sections of the limestone strata of the United States; and other wonderful and beautiful sorts are only waiting to be found.

The value of the larger fungi as articles of food is scarcely known and hardly appreciated in this country. The table recognizes them chiefly in the presence of ketchup, made of species indiscriminately gathered by those who prefer this article or sauce. It is probable that a few only are really deleterious and poisonous, and even these are rendered comparatively innocuous by heat and spices. Otherwise than this they are rather objects of prejudice, and most persons look upon them with disgust. Even for their mere exterior beauty they are seldom sought, and still less are they employed for ornament, like their equally fugacious and soon-fading sisters, the many sorts of wild flowers which decorate the parlor. I have, however, seen them gathered and arranged for this purpose, and with singular effect; and the interest such groups, exhibited at the Horticultural Society Rooms in Boston, elicited was worthy of remark. The number of the *Agarics* described by Berkley in his "Outlines" is 564, as found in England, yet scarcely more than a single species, the *A. campestris*, is made an article of food. This species is represented in this country, and when cooked is

certainly a pleasant morsel. The Rev. Dr. M. A. Curtis, in his Catalogue of the Plants of the State of North Carolina (Geological Report), 1867, gives 438 species of Agarics, of which he considers fifty-six as esculent. In Poland and Russia even such abstemiousness is unknown, and most kinds of the larger fungi that occur are employed for food by the common people, either in a dried state, or after pickling in salt or vinegar. That there are highly poisonous qualities resident in several is indisputable, and is well known, as has been shown by Christison and others; one being an acrid matter so very fugacious that it disappears when the plant is dried or boiled or macerated in weak acids, alkalies, or alcohol; the other principle is more fixed, resisting the action of these tests, and resembling in its effects the operation of opium.

Many years ago, Greville, in a Memoir before the Wernerian Society of Edinburgh, directed the public attention to the use of the esculent fungi as a staple article of diet; and Schwaegrichen, the illustrious editor of Schweinitz's first contribution to the knowledge of our North American species, derived great satisfaction in eating those which possessed neither a bad flavor nor a disagreeable smell, and which had a tolerably firm consistence, with bread and drinking nothing but water; such a diet pursued for several weeks, as he affirms, increasing his strength and improving his health. "I have observed," says Persoon, who furnishes this account, "that fungi, if moderately used, are very nourishing." The experiments of Braconnot and Letellier detected a substance to which the name of *fungin* is applied, present equally in the harmless and poisonous fungi alike, which in itself is highly nutritious containing nitrogen, and very similar in its composition to animal matter. The process of cooking is therefore conducive to the gustatory condition, and advantageous in overcoming what is deleterious, if present in species considered esculent. A more general as well as accurate knowledge of our native species would place these despised

plants on the same level with other and higher forms, which embrace among our garden vegetables wild states of several equally poisonous and of many plants beside, often mistaken for harmless ones, ending, if used, in fatal results.

About eight years ago appeared the Rev. Dr. Badham's valuable work on the "Esculent Funguses of England," with drawings of the species colored after nature, and defining their localities, uses, and importance; indicating attention in the right direction to this subject, and followed shortly after by the little treatise whose title stands at the head of this article. To understand the arrangement and classification of the fungi requires a careful study of the systematic treatises of such botanists as have made them a specialty, and to give even an idea of such systems would be out of place here. Yet some peculiarities noticed by our author may not be wholly devoid of interest. "To say that fungi may be found everywhere, would not perhaps be literally true; but to say where they are *not* found under any circumstances would be puzzling,—every rotten stump or twig, every decaying leaf or fruit, has its peculiar species,—some large enough to attract immediate attention, others so small as to be invisible to the unaided eye." (p. 3.)

Of these latter may be mentioned, as confirmatory of this statement, the parasitic fungus, which destroys by a slow consumptive disease the life of the common House-fly (*Sporendonema musca*); and the *Botrytis bassiana*, which infests the silk-worm; the mother of beer and vinegar is the mycelium\* of other species; and similar mycodermis\* riot in the inkstand, and even in pharmaceutical preparations; the decaying hoofs and horns of animals, and the feathers of birds produce their particular kinds; the lungs of water-fowl are attacked by others; the skin of fishes, and the eggs of toads and frogs are destroyed by parasitic fungi. No substance escapes their visits, and even iron hardly cooled has been found invested in a few hours with fungoid threads. The

\* Conditions of fungi in open or matted threads, from which mouldiness often springs.

minute organisms, which serve for seeds and known as spores, float in the air and lodge in the water, waiting opportunity to germinate and grow. Even the cavities of nuts, and the tough kernels of apples develop certain species; and roots and solid timber alike are rent asunder by the presence of particular kinds. The mildews which cover our gooseberries and hops, and the foliage of the vine, or the husk of the ripening grain, are forms of the smaller fungi, and all powerful in their littleness.

"Nor are these plants less worthy of notice on account of the rapidity of their growth. The great puff-ball springs up in a marvellous manner to the size of a pumpkin during the night, and Dr. Lindley has computed that the cells of which its structure is composed have multiplied at the extraordinary rate of sixty millions in a minute. Dr. Greville mentions an instance of one of the largest of British fungi (*Polyporus squamosus*) attaining a circumference of seven feet five inches, and weighing thirty-four pounds after having been cut four days. It was only four weeks attaining to these dimensions, thus acquiring an increase of growth equal to nineteen ounces per day." This rapidity of growth is only equalled by the amazing power which vegetables, so fragile and tender in their tissues, possess; instances being cited where pavements have been lifted by the growing of fungi beneath; but somewhat of the same phenomena may be yearly seen in the woods, where clusters of brittle fungi, by perpendicular pressure, lift masses of earth and leaves upwards as they issue into the air and light; and in the early spring the same phenomena may be seen where the flowers of the Christmas-rose penetrate the frozen ground.

"It is a curious fact in connection with the growth of these singular plants" (the fungi), "that while Phanerogams absorb carbonic acid from the atmosphere and respire oxygen, in this instance the order is reversed, and carbonic acid gas is given off. Fungi appear to flourish best in the absence of light, in dark cellars, under flag-stones, in hollow trees and

in like places, where no other form of plant could exist; while some are entirely subterranean. The *forms*, too, which these singular plants assume are extremely diversified; in some the form is that of a cup, in others of a goblet, a saucer, an ear, a bird's nest, a horn, a bunch of coral, a button, a rosette, a lump of jelly, or a piece of velvet. In color they are almost as variable as in shape, the rarest color being green. We have all shades of red, from light purple to deepest crimson; all tints of yellow from sulphurous to orange; all kinds of browns from palest ochre to deepest umber, and every graduation between pale gray and sooty black; blue and violet tints do not abound, but these, as well as a beautiful amethyst, occasionally occur. White and creamy traits are very common. Odors are manifestly agreeable or disagreeable to a considerable extent, according to the taste of the inhaler, but it must be confessed that some of the fungi exhale an odor so intolerably fetid, that no set of olfactory nerves could be found to endure it longer than was absolutely necessary; the truly elegant but rare *Clathrus* being an instance to the point. Fortunately this unpleasant feature is not common in the fungi, some smelling like new-made hay, like violets, like anise, or walnuts, or new meal, or tarragon,—and a variety of flavors which the fungi possess is calculated to please."

It has been asserted by some botanists that climate greatly modifies the properties of these plants, and renders them harmless, where found out of their native habitats. A magnificent species, known as the *Amanita muscarius*, or Fly Agaric, a native of Europe, and found in our woods, is one of twelve species occurring in England, of which many beside this one, are decidedly poisonous and used in the preparation of fly-paper. Roques, in his work on the esculent fungi, distinctly says, "That this plant has not its poisonous qualities modified by any climate, the Czar Alexis lost his life by eating of it, and yet it has been affirmed that in Kamtschatka it is used as a frequent article of food, and is

cooked and eaten in Russia. In Siberia, it supplies the inhabitants with the means of intoxication similar to that produced by the *haschisch* and *majoon* in the East."

Under the vague and general name of mushrooms, several species of fungi are consumed as articles of food. It may be true that in some localities, only one or two species are dignified with the appellation of mushroom, while all the rest which resemble it in form are condemned as toadstools: yet we believe there is in prospect an age when more of those which are really worthy will be admitted to the tables of rich and poor without that accompaniment of suspicion and dread which attaches to a dish of mushrooms. We accord perfect justice to *Agaricus campestris*, the mushroom of cultivation, whilst more delicious kinds, and equally harmless, are allowed to flourish and decay year by year without molestation.

Dr. Badham, whose work we have already mentioned, gives us instances of "beefsteaks growing on oaks in the shape of *Fistulina hepatica*; *Agaricus fusipes* to pickle in clusters under them; puff-balls, which some of our friends have not inaptly compared to sweetbread for the rich delicacy of their unassisted flavor. *Hydnum*, as good as oysters, which they somewhat resemble in taste; *Agaricus deliciosus*, reminding us of tender lamb kidney; the beautiful Yellow Chanterelle, the *Kalon kai agathon* of diet, growing by the bushel; the sweet nutty *Boletus* in vain calling itself *edulis* (edible), where there was none to believe; the dainty *Orcilla* (*Agaricus heterophyllus*), which tastes like the crawfish when grilled; the red and green species of *Agaricus*, to cook in any way, and equally good in all."

Of this list of dainties let us see what we have among us wherewith to replenish our larder. The beefsteak (*Fistulina*), though not given in my friend Sprague's second list of New England fungi, in the Proceedings of the Boston Society of Natural History, vol. vi, p. 315, is credited to D. Murray in a previous list of the fifth volume, p. 325; and

according to Schwinitz, is common throughout all Pennsylvania, and often of the greatest size. We must forego the pickled *Agaricus fusipes*, unless brought to light by Curtis or Ravenel; the creamy puff-balls, which in the *Lycoperdon giganteum*, is, according to our author, excellent eating, especially esteemed in Italy, and on the authority of Mrs. Hussey (author of a costly work on British Mycology) are, when sliced and "dipped in the yolk of egg, and sprinkled with chopped meat, herbs, and spices, much lighter and more digestible than egg omeletts:" these rare bits are represented in the *L. Bovista*, which attains an enormous size, and would furnish "omelets" for an army. Then for vegetable oysters we have several species of *Hydnum*: the lamb's kidney in pine woods is the *Lactarius* (or *Agaricus*) *deliciosus* and the *voluminum* is in Mr. Sprague's list, a more common species; as to the "beautiful yellow Chanterelle," which smells like ripe apricots, a bright sunny afternoon in September revealed such a group to my eyes as has gladdened them ever since when my memory has recalled the scene; the edible *Boletus*, if not among our native species, is curiously represented by some counterfeit, and, according to C. C. Frost, occurs in the woods of Brattleboro', Vermont; the dainty *Orcella*, I am sorry to say, is found in bad company with species of *Russula*, and no matter if wanting with us, a genus containing "some of the best and some of the worst of fungi viewed in an alimentary aspect, and some of the most brilliantly colored species."

Our author gives us quite a list of species not uncommon in England, some sold by the quantity in the markets with their true scientific names, without which they could not be recognized with any degree of certainty. In a few instances we have been able to identify them with American kinds, by comparing reliable catalogues of our own mycologists; but even this method is not without certain objections, since by the united labors of Berkeley and Curtis, the Schweinitzian collection has been found not so authentic as it could be

wished. The student, curious in these matters, may be referred to these papers in the Journal of the Academy of Natural Sciences of Philadelphia, for July, 1856 (new series), and to those in the Memoirs of several Scientific Societies, and to Dr. Curtis' list of plants alluded to above. But in an enterprise like the one before us, the efforts of gastronomy must be enlisted, and a series of experiments instituted upon our New England species. Plants thus low in the order of vegetation would be most likely to be represented by co-species and transatlantic forms, equally good for food or dangerous as viands, possessing the chemical principles which are to be sought and found in them.

The fairy-rings, described in English books, are due to the presence of a modest little Agaric, figured and colored to life, under the name of *Marasmius oreades*, an appellation which we find in Mr. Sprague's list, but with which we have no personal acquaintance. "The little fairy-ring Champignon," says M. C. Cooke, "is one of the privileged few that enjoy a good reputation, but even in this instance the reputation is local. In the dried state they are available for culinary purposes, while thousands of them annually rot in the pastures, where they grow without a hand to gather them. There is scarcely a more delicious fungus. It is so common in districts that bushels may be gathered in a day. They may also be readily dried by stringing them together on a thread, and suspending them in a dry kitchen, and when thoroughly dried may be kept in close tins."

Allusion has already been made to the *Boleti* as articles of food, of which both England and this country possess many species. In selecting them for trial in cookery, we are informed that "it will be advisable to caution all who are inexperienced in collecting *Boleti*, that several are unwholesome, some decidedly poisonous. If upon cutting or bruising any specimen it should be found to change color, it should be rejected. Some species become blue almost immediately upon wounding; those with reddish stems, or

with the under surfaces red or crimson, should also be rejected."

Any one familiar with our woods in the autumn must recall the numerous sorts of the coral fungi, so delicate and branched in variety of shapes, as to remind him of the corals of the ocean. They bear the generic name of *Clavarie*, from *Clavus*, a club, the single branches being blunt or club-shaped at the apices. If such on being gathered and carried home are laid upon a piece of slate or black paper, a multitude of small white particles, or perhaps of a bluish-gray color, will fall from them, and become visible after a few hours. These are the *spores*. "All the white-spored *Clavarias* are wholesome; but some are so tough and leathery, and others are so small, that the number at all available for culinary purposes is limited. They should, after being collected, be washed in lukewarm water and perfectly dried, then tied together in little bundles like asparagus, and cooked with butter, parsley, onion, pepper, and salt; when cooked, they may be improved by the addition of a little cream and the yolk of an egg."

The English and European species cited are *C. C. cinerea*, *amethystina*, *rugosa*, *vermiculata*, *fastigiata*, *coralloidea*, and *cristata*, of which we have several, and representatives of the others. The *Helvellas*, like the *Morels*, to which allusion has been made, are also classed among the edible kinds, and represented in our country in two more species at least. "The best substitute for the expensive *Morels* may be found in two indigenous species of *Helvella*, which, like the *Morels*, may be gathered during the season, and dried, and thus preserved for use all the year round. They impart an excellent flavor to gravies and soups." Related to these, but of different shape, size, color, and consistence, are the numerous *Pezizæ*, of which the list of North American exceeds at least two hundred species; and in Great Britain one hundred and thirty or more. They are interesting to the mycologist, presenting in their exterior both delicate and gorgeous tints,

varying much in size, and found almost everywhere in moist situations. "In the manufacture of the handsome Tunbridge ware, a variety of wood is employed under the name of green oak. Although of a mineral green color, this is the ordinary British oak; but the alteration which it has undergone is due to the presence of a fungus. A handsome little species resembling a *Pezizia* traverses with its mycelium the whole fabric of such wood, and these minute threads give the green tint to the timber." Similar tinted but decayed sticks and pieces of timber may be found in our own woods, owing doubtless to a similar cause.

In conclusion, it is to be hoped that the coming season may be seized upon for collecting, delineating, and coloring from living specimens some of the many fine and curious species of this vicinity; and that our naturalists may institute experiments, aided by the chemist and the gastronomer, in this line of wholesome, novel, and dainty tidbits of the table.

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## SPONGES.

BY A. HYATT.

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AMONG the dark-brown leaves and green filaments which are borne upon the edge of the incoming tide, one frequently observes a substance hardly distinguishable from the surrounding plants, except for its light-brown color and porosity. This is sometimes dendritic,\* with lank branches springing from broad, thick-spreading bases; but generally it is broken into fragments, and only the palm-like parts, with their finger-shaped ends, are left grasping among the froth-covered sea-weeds. A slight pressure will expel the water, and the aspect of the half-dried specimen will at once arrest attention.

It is in fact a Sponge, differing only in the details of its

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\* Branching like a tree.

structure and its general form from the sponges of commerce. The latter, whose irregular swelling outlines are so familiar to us, are of foreign origin, the better kinds coming from the more eastern shores of the Mediterranean, the coarser and larger kinds from the Bahamas. The commercial value of these is based upon the horny nature and closely interwoven texture of their internal skeleton.

A sponge is, typically, a gelatinous mass, in which is imbedded numerous little spikes and plates, of a horny, calcareous, or siliceous substance; or hair-like threads of various forms, which are so thickly disposed and closely knit together by animal matter, that they form a sort of open-work frame supporting the looser tissues.

In the common sponge this frame-work is wholly composed of horny hairs, which are so densely packed and elastic that they immediately resume their original shape after being compressed. The gelatinous matter is in all cases cleaned out after the sponge is torn up from its rocky bed, and those which we utilize are only the horny skeletons of the living animals. So loosely constructed and fragile, however, are the large branching species of our own coast, that a dried specimen may be crushed to powder in the hand.

The exterior of our beach specimens have a furry look, due to the projecting points of the spiculae, which protrude through the outer skin. Scattered holes of considerable size reveal portions of the interior, and between them are innumerable smaller pores. These larger apertures connect with distinct channels which ramify through the mass in all directions, and, when surrounded by their native element, expel continuous jets of water. In fact the whole is only an apparatus for absorbing and ejecting sea-water, well deserving its old name of sea-lungs.

The surrounding liquid is taken in through the smaller pores of the outer side, and, passing through the lung-like interstices of the structure, is finally collected in the main channels and thrown out again, together with quantities of

feculent matter through the larger openings. The meshes of the sieve and the channels are thickly lined with myriads of microscopical animalcules, to which the perpetual current bears their minute food, sifted of all the coarse, unsuitable particles, and maintains an invigorating supply of fresh seawater throughout the whole colony. The animals themselves create this current by the motion of ciliæ, or little hairs, which grow out from the region of the mouth. The form of their bodies has been ascertained in only one species, called *Leucosolenia botryoides*. In this, which is quite small, though common on the shore, Professor H. J. Clark found that they were minute sac-shaped beings, with a collar projecting from the free end, in the middle of which was the mouth, situated at the base of a long filament which was hardly ever at rest. It seemed to be employed principally in casting morsels of food down into the mouth, and this action, in itself so slight, is yet, when carried on by the thousands of neighboring filaments, sufficient to keep the fluids in rapid motion through the meshes.

Until of late years the animal nature of the sponge was disputed. Then it was referred to the *Amæba* forms, creatures which are mere sprawling drops of jelly, without mouths or stomachs, but which, however, manage to move about, and even in some species build up most elaborate internal structures resembling minute shells. Now, through the investigations of Professor H. J. Clark, we know that they are colonies of such comparatively highly organized beings as those I have described, and we are also able to state, upon the same authority, that their young are free, roving globules, resembling an isolated individual of the parent stock.

The mode of growth has not been studied in the sponge itself, but in a closely allied animal where a number of little bells grow upon a stem (*Codosiga pulcherrima*). The young of this is free at first, but finally attaches itself, and becomes elevated on a pedicle. Then the vase grows more

oval, the opposite sides at the narrowest diameter approach each other, coalesce and split, dividing all the internal organs, and the mouth and calyx, or collar, into two parts. Two other filaments grow up from these halves, and a fissure begins in the disk, which gradually spreads both upward and downward, until two transparent vases, complete in structure, swing upon the trunk which bore only one an hour before. This process in some species is continued until quite a cloud of descendants cluster around the parent branch, but in others, again, only separate and distinct individuals are produced, the division totally separating the stem as well as the body.

The sponge, probably, grows in the same way; but the vases, having no stems, remain attached side by side, and secrete the gelatine and spiculae, or horny hairs, from the lower surfaces of their bodies. These support the membrane and enable it to maintain a definite outline, and continue its growth without the danger of collapsing.

There are several species on our coast, but the most noticeable is the great *Halichondria*, whose favorite resort is an old wharf-pile. This may not seem an attractive object, but Nature has clothed the whole coast with her living tapestries, and even here, her taste is as faultless, and her hand as lavish in decoration, as in more favored and sunnier spots.

Get into your boat, and when the tide is lowest float down under the wharves through which the current has a clean sweep. The waves lift the dank bladder-weeds and long green sea-hair which cover their stained sides, while below these, brown clusters of mussel-shells open their fringed mouths, and huge anemones, as thick as your arm, spread their laced crowns of white, brown, crimson, or variegated colors on the water-worn logs; and in the midst our great sea-lungs hangs out its mass of branches, and spreads its weird fingers up towards the observer. Even the sponge is beautiful in such places and with such associations.

## NOTES ON TROPICAL FRUITS.

BY W. T. BRIGHAM.

[Continued from page 186.]

*Cocos nucifera*, Cocoanut. To attempt to give a bare enumeration of the qualities of this most useful of the noble family of Palms would be a difficult task, and there is a saying among Eastern nations that its attributes would fill a book. Although its strict territory is bounded by the tropics, and although a denizen of the sea-shore, it will grow as far north as Lucknow, in India ( $26^{\circ} 50' N.$ ), and is planted far in the interior of that peninsula; but in the one case it does not bear fruit, in the other is dwarfed and languishes. From its littoral position, its buoyant and well-protected nuts have been driven by winds and currents all over the tropical seas, and almost as soon as the atoll changes from a mere reef to an island, the cocoanut lands on the shores.

The tall unbranching stem, often attaining the height of ninety-feet, with a diameter at the base of three feet, and at the crown a foot, is a most attractive object. The scars of the fallen leaf-stalks, more and more distinct as they approach the top, show clearly the way in which the stem has grown, starting almost at the commencement of life with its full diameter, and throwing off crop after crop of leaves as it grows in height. The leaves are usually twelve or fifteen in number, often fourteen feet long, and cluster around the cap. As a new leaf comes out, it is covered with a brown fibrous sheath, which is soon split through by the sharp end of the leaf. At first the leaflets are folded closely upon the central rib, so closely that they seem a part of the smooth, bright green blade. The midrib is now quite short, much like the midrib of our common palm-leaf fans, and if we could crumple one of these dried leaves up, we should have much the plan of the young cocoanut leaf. If the blades

should now expand the leaf would be palmate ; but it goes on lengthening the axis and becomes pinnate, showing a higher order of development. Five or six leaves are unfolded every year, and as many wither and fall off. When young the leaves are quite tender, but when fully expanded, become very stiff and hard.

The axillary spathe opens always on the under side and soon falls off, leaving a spicate spadix bearing the female flowers near the base ; as in most palms the blossom is beautiful from the great number of the flowers, rather than from any individual grace. In favorable places each stem will bear from five to fifteen nuts, and a mature tree may have eight or ten, or even twelve of these stems, one blossoming every four or five weeks ; so that a tree will produce from eighty to a hundred nuts annually. They ripen in succession, so that blossoms and fruit are seen at once.

As the fruit comes to us its glory is gone. It is in its best condition just before ripeness, or when the shell is soft enough to be cut with a knife ; then the interior is filled with a rich clear milk, always cool when just gathered, and the shell is coated with a gelatinous cream almost transparent, and so soft as to be eaten with a spoon. When fully ripe, the inner crust has hardened, and absorbed the better part of the milk, leaving an insipid water. The milk is quite nutritious, and many medicinal effects have been attributed to it. I have drank nothing else for several days, without perceiving any unfavorable result. It is perhaps with more reason regarded as a cure for sea-sickness. Carefully picked with a portion of the stem attached, they may be carried for three weeks at sea uninjured, perhaps longer, so that we might be supplied with fresh nuts from the West Indies.

A cocoanut is always planted with the three black spots, which are seen at one end, upwards. From one of these the stem rises, and the shell is soon split. Often the nut does not begin to germinate for six months, or even a year after

planting, and it grows slowly for the first two years of its life. In favorable situations the tree begins to bear when six years old, and continues until seventy years, or even longer.

It is said that the palm loves the company of man, and grows best near his habitation, and well may man return the love, for it furnishes him with all the necessities, and many of the luxuries of life, requiring no cultivation or care. The wood is hard in old trees, and very ornamental, and is used for timber. The rooslets are eaten, or rather chewed as tobacco: the young leaves are boiled and eaten as cabbage; when they are older they furnish a good surface to write on with a sharp point (cow-dung is usually rubbed in to make the characters more visible), and also to thatch houses, fence gardens, make baskets, mat-beds, fish-nets, fans, sieves, and hats; when old and dry, the stout midrib is used for clubs, paddles, rafters, fence posts; the ribs of the leaflets for brushes, torches, or the whole is burned to furnish potash. The husk of the nut is stripped off by means of a small stake fixed in the ground, and a man can strip a thousand nuts per diem, and the husks are then soaked for several months in water to separate the fibre, and finally twisted into rope, or woven into mats under the name of coir. This rope is very strong and light, does not rot when wet, and floats on the water. Forty nuts usually yield six pounds of coir. The undressed fibre of the husk is a capital polishing material, and sailors use nuts split in halves to rub down decks.

Before the spathe opens it is often tapped, and a clear juice runs out which is fermented to form toddy, or boiled down to make jaggery, or palm sugar. This tapping is supposed to injure the tree if long continued.

The ripe nut is cooked and eaten in various ways. When grated it is an ingredient of the best curries; mixed with sweet potato, or kalo, and baked, it forms a fine pudding. The Pacific islanders chew up the meat and rub it into their

hair as a pomatum, and whether owing to this application or not, their hair is exceedingly abundant and black.

The oil is, perhaps, one of the most valuable products. The Micronesians break up the nuts, and expose the meat to the heat of the sun in covered troughs, wetting the mass constantly. Fermentation takes place and the oil drops out into containers. The East Indian process is almost as rude, the nuts being ground in a wooden or stone mill of primitive construction. The oil produced, of course, varies in quality as well as in quantity, ten nuts producing one quart, or in other cases thirty nuts only three pints. In other places the ground nuts are pressed, and sometimes boiled. The best oil is used either for cooking purposes, or to anoint the body either before or after bathing,—a most grateful process in a hot dry climate; and the poorer qualities supply the lamps. Torches are often made of elephant's dung bound into cylinders by the ribs of the leaflets, and saturated with the oil.

*Borassus Sechellensis*, the Double Coconut. This was long regarded as a most valuable medicinal charm,—a sure remedy for sterility either of man or beast; but its reputation has much diminished. It differs from the ordinary coconut in having two distinct lobes, connected at the upper end so as to form a continuous cavity. The milk and meat are not so good as the common nut, and more resemble the contents of the Palmyra nut, so common in India and elsewhere.

*Phoenix dactylifera*, Date. The leaves are shaped like those of the coconut, but are stiffer and of a lighter color. The lower portion of the stalk remains attached to the stem long after the leaf has withered, making it rough and admirably adapted for harboring small snakes, centipedes, or the more agreeable parasites of the vegetable world. The male blossoms are exceedingly numerous, eleven thousand having been counted on a single spadix, and yet to obtain a full crop of fruit artificial impregnation is necessary. The hard

woody spathe is not deciduous, and adds to the untrim appearance of the tree. In Egypt the fruit clusters are often of a hundred pounds weight, and hang down from stems as large as a man's wrist. The yellow dates are the smallest, and the black ones the largest in some places, but there is a variety of yellow dates three inches long. The cluster does not all ripen at once, but each date that matures is at once removed to make room for the rest. Dried, they form the chief food for the Arabs, and are much liked by all who are able to get them. The crushed and dirty dates that come to our markets are very inferior.

The date tree is not so long lived as the cocoanut, and its uses are by no means so extensive. The wood is soft, the blades of the leaves hard and narrow, and of course the coir and oil are wanting, and yet the fruit is perhaps the most delicious produced by any palm.

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### THE CYNTHIA SILK-WORM.

BY W. V. ANDREWS.

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It is not at all a creditable circumstance to us, as an enterprising people, that so little has hitherto been done towards making silk-culture a source of national wealth. Thirty years ago, according to Mr. d'Homergues' account, some spasmodic efforts were made in this direction; but, for some cause, chiefly I imagine from the absence of skilled labor, the thing came to naught. In Connecticut, principally in the counties of Windham and Tolland, sewing-silk was manufactured to some extent; but even there the "hands" persisted in reeling the silk after the fashion of their grandmothers, and were far too knowing, and shrewd, to allow themselves to be taught anything by outsiders, who, probably under the cloak of a desire to communicate know-

ledge, harbored some base design on the pocket. What is being done in that locality now I do not know, and the only sewing-silk manufactory that I know of, is that of the "Singer Sewing Machine Company," in New Jersey. Of course all the silk they use is imported.

The silk-producing moth of the period above adverted to was, of course, the *Bombyx mori*, and the same species has continued up to a very recent period, to furnish most of the silk manufactured in Europe. With the conservative feeling which forms so admirable a trait in their character, the English have stuck to their old friend through good and evil report, till at last the disease which threatens to exterminate this once valuable insect, has compelled them, as well as their neighbors the French, to cast about for some more healthy silk-producer. Two species seem to recommend themselves, and they are the *Yama-mai*, and the *Cynthia*; the last-named being the favorite; and this is the moth whose culture here, as a silk-producer, it is the object of this paper to recommend. It has been asked, Why not select some native American species, and thus get rid of difficulties which will, doubtless, occur in the attempts to acclimatize this foreigner?

In the first volume of this Magazine, Mr. Trouvelot has shown, more or less satisfactorily, that our principal silk-worms, *Cecropia*, *Luna*, and *Promethea*, do not produce a cocoon suitable for the silk manufacturer. I must confess that I have my doubts of this. It seems to me, as the cocoon is made of silk, that, under favorable circumstances, it may be made serviceable; but I concede that, at present, we should turn our attention to other species. The *Polyphemus*, Mr. Trouvelot thinks, is the only American silk-worm worthy of present attention, and I agree with him. The silk produced by it is coarse and strong; and I am positive may be turned to profitable account. It possesses, too, I think, an advantage, in that the cocoon can be unwound with comparative ease.\*

\*For descriptions and figures of the *Telca Polyphemus*, see AMERICAN NATURALIST, Vol. I, pages 35, 85, 145, and plates 5 and 6.

But the principal objection to the American silk-moths is, that they produce only one brood a year, with the exception, I believe, of *Luna*. Now the *Cynthia* can be made to produce two broods easily; and, so far as I can see, the cocoon of the second brood is just as good as that of the first. Again, the food of some of the species is of very slow growth; such as the oak, the elm, and the hickory.

Now the food of the *Cynthia*, at least in this country, is the ailanthus, a tree of luxuriant foliage and rapid growth; and, at present, more ornamental than useful. If we acclimatize the *Cynthia*, we can reverse the order of things. It is somewhat doubtful, for reasons I shall presently give, whether the ailanthus is the natural food of this insect; but I will waive that consideration for the present.

In view of the confusion which evidently exists as to the identity of *Cynthia*, I think it best here to state, that the insect I am writing about is the one figured, tolerably well, in Duncan's Exotic Moths, Plate 14, fig. 1. The coloring there is not quite correct, but that is, doubtless, the moth.

Drury (Westwood's edition) has also given a tolerably accurate figure in his "Illustrations," and taking (as every body else seems to have taken) his description from that of Dr. Roxburgh's Memoirs on the Silk-producing Moths of the East (Transactions of the Linnean Society, Vol. 7), calls it the "Arrindy Silk-worm;" says that it feeds on the castor-oil plant, and that its *soft* cocoons are so delicate and *flossy*, that it is impossible to wind them off, and that therefore they are spun like cotton. Now this description, which is substantially quoted by Mr. A. R. Grote in the "Practical Entomologist," by no means applies to the cocoon of the *Cynthia*. It is not a soft, flossy cocoon, like that of *Cecropia*, but hard like that of *Promethea*, which indeed it generally resembles. There is, to me, certainly a difficulty in winding it; and this, at present, is the main objection to it. But this difficulty arises from our ignorance of the proper solvents for the gum of the cocoon, and the proper temper-

ature at which to apply it. Pearlash is the best solvent I have yet found, but it is not, as I apply it, satisfactory. In fact a practical silk-reeler is required to decide this point. Mr. Grote, in quoting Kirby, who quotes Drury, expresses a doubt as to whether the *Cynthia* is really meant by the latter; and from all that I can learn the castor-oil feeder is certainly a different species.

Mr. Grote, in a subsequent paper in the "Practical Entomologist," says that the *Cynthia* is the *Yama-mai* of Japan, and that in that country it is an oak feeder; but surely this is a mistake of the Dutch author, from whom Mr. Grote transcribes. I have not reared *Yama-mai*, but I have some of its eggs, sent me by Dr. Wallace, of England, and they are nothing like the eggs of *Cynthia*. They are much larger and altogether of a different color.

To make confusion worse confounded, the very capital description of *Cynthia*, given by M. Tegetmeir in a recent English publication, is accompanied by a colored drawing of the insect, as much unlike that moth as the artist could conscientiously make it. So when we have the description right, the illustration is wrong; and *vice versa*, when the illustration is good, the description is bad. However, we have fixed on our moth. It is, as I said before, the *Saturnia Cynthia* of Duncan. Farther description I need not give, except to assure ladies who have so far got over their horror of "bugs" as to rear butterflies and moths, that they will find the extreme beauty, both of the *Cynthia* and of its caterpillar, a full recompense for any little trouble they may take in raising them.

I will now condense from a little entomological journal kept by me (I make no pretensions to being an entomologist), some remarks, having practical application to the subject before us; and which, I hope, may be of service to those who wish to assist in acclimatizing this beautiful moth, with a view to its ultimate culture as a silk-producer.

The eggs, which I obtained from Mr. John Akhurst, of

Brooklyn, were laid on or about the 18th of May, last year. From description, I had expected to find the eggs white, and without any central depression. I found them white, *streaked with black*, and the depression very obvious. The eggs commenced hatching out on the first of June, making about twelve days in the egg. The caterpillar is yellow, with transverse rows of black dots; head, black. On the 6th of June occurred the first moult, the yellow color brightening somewhat. On the 11th of June, the second moult, the color lighter, almost white. After the third moult the color is white, with black spots; the head and legs yellow. In fact, the body is covered with a very fine white powder. It has been objected to the *Bombyx mori* that it must be raised within shelter, seeing that exposure to heavy rains is injurious to it. Now *Cynthia* stands exposure to the wet admirably, as I had perfect satisfactory proof last year, the above-named white powder, as it is conjectured, standing it in good stead in a storm. Moreover, a certain amount of moisture is necessary for it. The caterpillar drinks greedily, and, in the event of indoor culture, I advise that the branches, when served fresh, should either be dipped in water, or sprinkled abundantly, particularly after the third moult.

I need hardly impress upon the mind of any one likely to read this paper, the absolute necessity of keeping the caterpillar well fed; but it may be as well to forewarn everybody that these creatures have excellent appetites, which "grow with what they feed upon." This is peculiarly observable towards the close of the caterpillar life, say after the last moult, when the craving seems to be insatiable. For those who have the opportunity of doing so, after the third moult, it is a good plan to place the caterpillars on low ailanthus trees in the open air. Of course they are liable to destruction here by birds, as well as by parasitic flies; but still, if you have a large quantity, and it is inconvenient to feed them under shelter, this plan may be adopted. Last year I

raised a great many in this way (this year I intend to increase the number), and as the caterpillar does not wander, I found no difficulty in collecting the cocoons. I allowed some to remain on the trees for the second brood, and had the satisfaction, in the fall, of seeing lots of cocoons swinging in their leafy cradles. And now is the time to speak of the ailanthus as not being the natural food of *Cynthia*. It feeds, we are told, on the castor-oil plant, laburnum, teazle, plum, honey-suckle, and spindle-tree. This sounds very much like saying that it will eat anything; but so far as my experience goes it thrives better on the ailanthus than on anything else; but the reason that I think that tree is not its natural food, is this: the caterpillar forms its cocoon very much in the manner of *Promethea*; that is, by folding a leaf around it, having first gummed the leaf-stalk to its branch, so as to prevent, one would suppose, its falling to the ground in winter. But the leaf of the ailanthus is what botanists call a compound leaf; so the unfortunate caterpillar, not being sufficiently versed in botany to know this, merely gums the *leaflets* to the petiole; the leaf of course falls in the autumn, and the pupa, instead of lying high and dry as was intended, lies under the snow all the winter; with what consequences to itself I am not able at the moment to say. It would appear, therefore, reasoning from analogy, that the tree forming the natural food of *Cynthia* has a simple and not a compound leaf. It may be of consequence to note this, for the quantity and quality of the silk produced by any worm very much depend on the food it eats, and the natural food must be the best.

I will now proceed with my extracts from the journal. On the 28th of June, just twenty-eight days from the hatching, the caterpillars commenced forming their cocoons; and here let me say to those who propose to raise them in the house, that at this period it is essential that there shall be a good supply of well-leaved branches. Every caterpillar will require a leaf to itself, and if these be not forthcoming the

cocoons will be doubled, and even trebled, to the great injury of the silk, it being impossible to wind the silk off a double cocoon. On the 21st of July the moth appeared; three weeks in the cocoon; and by the 6th of August the second brood of caterpillars began to hatch out; these going into the pupa state about the middle of September, and remaining there up to June 10th, I having kept them back a little on account of the backwardness of the spring. "On that date the first *Cynthia* from my collection of cocoons made its appearance, and there is every prospect that a few days more will witness an increase in that portion of my insect family."

I have now said enough to show that the rearing of this moth is a very easy, simple process, one which may be attended to by any boy or girl of ordinary intelligence, superintended of course, if the number raised be very large, by some older person. In a word, it furnishes profitable employment for those members of the family unable to perform harder labor. And this reminds me that if the feeding be done within doors, the food branches, or, at the outset, simply the leaves, should have their stems immersed in a vessel of water; some precaution being taken to prevent the young caterpillars from wading into, or falling into it. When nearly full-grown the clusters of fine caterpillars, set off by the rich green of the ailanthus leaf, form a very beautiful sight; and although I cannot conscientiously recommend such an ornament for the drawing-room table, it certainly may be placed almost anywhere without being offensive to the most fastidious eye. Plenty of air and light should be given them, but they should not be exposed to the direct rays of the sun. Reared, even from motives of curiosity, and without a view to immediate pecuniary results, the task cannot be performed without teaching a lesson, which will be of infinite value to the mind anxious to inform itself of the wonderful workings of that law of nature, that transforms a small crawling animal, of an eighth of an inch in

length when hatched from the egg, into a beautiful flying creature large enough to be mistaken for a bird, and with no more resemblance to the aforesaid animal than an eagle has to a frog.

But now a final word as to the steps to be taken to induce our people to take up this business of silk-culture. Can it be made to pay? is, I suppose, the main question. I need go into no statistics to show that enormous sums of money are sent to Europe every year to pay for silk imported; the fact is notorious. Perhaps no nation in the world is so addicted to the use of silken goods as the American. The general government collects large sums of money in the shape of duties on silk, and we can hardly, at the moment, expect that it will do much to encourage its culture here. But I am confident that it can be made to pay without government assistance. For, recollect, that we have the food of the caterpillar growing already in the greatest abundance among us, flourishing with a luxuriance which we sometimes find inconvenient; and of such easy culture that in two years we could have millions of bushes (and they should be kept as bushes) growing; and on soil, too, that would probably produce nothing else. This is an advantage that the early silk-growers did not possess, the raising of the mulberry being no such easy matter. Then the larva of the *Cynthia* can, as I have said, be raised in open air, and the labor of the young, or of the feeble, is sufficient to perform all the work required; and thus the objection of the "high price of labor," so fatal to many an American enterprise, fails in this case. Even children may be induced to raise a few bushels of cocoons for the sake of pocket-money. Still there is no use in raising cocoons if there are no manufacturers to purchase them. It seems difficult to account for the inertness of our capitalists in affairs of this kind. One would suppose that with men possessed of wealth, the reputation of having been instrumental in introducing a new source of national industry, would be sufficient to induce

some few at least to bestir themselves in so important a matter. But failing this, what objection is there to the *State Government* affording a little assistance in starting an enterprise promising to be of such great benefit to the people? I look upon an enterprise of this kind as of the nature of building a railroad, or constructing a telegraph line, the benefits to be derived from which, being of a public nature, come very properly under the immediate supervision of the government. It would be out of place in this journal to go minutely into such things as the duties of governments in fostering national industry, but I may be permitted to say, that, although disapproving of the principle of protective tariffs, I see nothing conflicting with my convictions on this point in saying, that, if the timidity of individual capitalists can be overcome in no other way, the State Governments would be justified in making advances, or in offering bounties, sufficient in amount to guarantee parties embarking in the enterprise of silk manufacture against any actual temporary loss.

In England, as I am told, private enterprise is doing all this. Wealthy individuals are largely cultivating the *ailanthus* for the *Cynthia*, and are encouraging parties in rearing the *Yama-mai*, and other silk-producers; and why should not as much enterprise and patriotism be found here? To be sure, entomologists are not there laughed at for being "bug-hunters;" and there are numbers of ready hands willing and anxious to assist in the undertaking; but I am not without hope that sufficient intelligence will be found amongst ourselves to enable people to understand that a devotion to the study of Nature's laws, even in the insect world, is not incompatible with the possession of, at least, average common sense.

Let it not be forgotten that the rearing of the *Cynthia*, as a silk-producer, is not a new, untried experiment. The Chinese, for a longer period than I should like to mention, have manufactured silk from its cocoons; the garments made from it possessing a durability quite annoying to ladies of the

Flora M'Flimsy type. Dresses made up for ladies in the early dawn of womanhood do very well for their grandchildren arrived at a suitable age; and, if this be not a recommendation, let us hope that the fact that some English manufacturers have given the opinion that the silk from the *Cynthia* may be made into shawls equal to the best *India*, may somewhat reconcile our fair countrywomen to the use of an old article possessing the preposterous quality of being as good as new, if washed in a little cold water.

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## REVIEWS.

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THE NORTH AMERICAN GRAPES. By Dr. George Engelmann.—Perhaps the first plant noticed on the continent of North America, even before Columbus and before the Pilgrims,—a plant identified with the discovery of America itself,—was the Grape-vine; it gave to the country the name *Vineland*, and later, to a part of it, that of *Martha's Vineyard*. And yet the grape-vines, many forms of which grow from Canada to the Rio Grande, and from Virginia to California, are among the least thoroughly known plants of North America. Linnæus knew two species; and that sagacious observer, the founder of the flora of North America, Michaux, added three more. These five species are acknowledged to this day as the principal forms found in the regions between the Atlantic and the Mississippi. But even in their native haunts they vary to such a degree, that both scientific and non-scientific observers have never felt satisfied about them. Rafinesque, about fifty years ago, undertook to describe and classify these forms; but, with his loose observation and lax scientific conscience, he, as usual, instead of becoming a guide, created inextricable confusion. Le Conte, long after him, did little to unravel the entanglement; and since their efforts to distinguish imaginary species, the tendency has rather been to combine what were formerly considered, even by conscientious authors, as distinct species.

I have long devoted much attention to the grape-vines of my home (St. Louis), but have become satisfied that no satisfactory solution can be obtained without the coöperation of the friends of botany throughout the whole country; so I ask from their love and zeal for our science, and from the general interest which this particular investigation now commands, their friendly coöperation.

In order to arrive at satisfactory conclusions, it is necessary to study all the forms which present themselves, in all their bearings, and under

the different conditions in which they are found. Specimens ought to be collected in flower, exhibiting also the young shoots and developing leaves, and, *from the same stock*, in fruit, if fruit they bear; and ripe seed should be obtained; the soil, the locality, the accompanying plants, and the size of the vine ought to be noted, the difference in shape and size of the leaves of young shoots and of bearing branches is often important; the exact time of flowering, and the period of maturity are interesting data; the size, color, and taste of the fruit, the presence or absence of the bloom on the ripe berry; the usual number of seeds in each, the conditions and color of the pulp,—all are points not to be neglected. It is not expected that species can be founded on the variations in all these characters, but it is important that the limits of variation of the different species should be defined; and that can only be done by exact study of as many forms as possible in all their bearings. Thus far I have only seen vines with perfect and with staminate flowers; purely pistillate ones may perhaps be discovered by acute observers.

The species now known to botanists in the territory of the United States, but several of them not sufficiently defined, are the following:

1. *Grape-vines with large Berries.*

1. *VITIS VULPINA* Linn., the *Southern Fox-grape*, or *Muscadine*, with several cultivated varieties, such as the *Scuppernon*, etc.

2. *VITIS LABRUSCA* Linn., the *North-eastern Fox-grape*, with numerous cultivated varieties, such as the *Catawba*, *Isabella*, *Concord*, *Hartford Prolific*, etc.

3. *VITIS CANDICANS* Engelm., the *Mustang grape* of Texas.

2. *Grape-vines with smaller Berries.*

4. *VITIS CARIBEA* DC., of Southern Florida and the West Indies.

5. *VITIS CALIFORNICA* Benth., confined to California.

6. *VITIS FESTIVALIS* Michx., the *Summer grape* of the Middle and the Southern States, with numerous varieties, of which var. *monticola* (*V. monticola* Buckley) of Texas approaches No. 5. and var. *canescens* of the Mississippi Valley approaches No. 7; several cultivated varieties, such as *Norton's Virginia Seedling*, and the *Cynthiana* grape, are among our best wine-grapes.

7. *VITIS CORDIFOLIA* Michx., the *sour Winter* or *Chicken-grape* of the Eastern States, and its variety *fetida* of the Mississippi Valley, often 4-6 inches in diameter, climbing the highest trees, and bearing fetidly aromatic berries. No variety I believe in cultivation.

8. *VITIS RIPARIA* Michx., the *River-bank grape*, throughout the United States to the Mississippi; the only grape in East Canada, where it extends sixty miles north of Quebec (Brunet); a valuable grape in cultivation, under the name of *Clinton*, *Taylor*, and *Delaware* grapes. An early native variety ripens its sweet berries early in July about St. Louis.

9. *VITIS ARIZONICA*, n. sp., and as yet doubtful plant, of Arizona, with small leaves, and middle-sized berries.

10. *VITIS RUPESTRIS* Scheele, the *Bush-grape* or (in Missouri) *Sand-grape*, which extends from Missouri to Texas.

It is worth noting that all those of the forms enumerated above, which I had an opportunity of raising from seed, exhibit marked differences already in the seedling plant a few months old. During my absence in Europe for the next twelve months, Professor A. Gray, of Cambridge, has kindly offered his assistance in communicating with those who wish to assist me, and letters directed to me, at St. Louis, Missouri, will be forwarded to me. — I. G. E.

THE CORALS AND STARFISHES OF BRAZIL.\* — But little is known of the shores of Brazil, and until their discovery by Professor Hartt, so graphically related by him in the *NATURALIST*, was it ever known that there were reefs of coral on that coast. Professor Verrill here gives us in a connected form a view of the radiate animals of Brazil, with notes on those of Lower California. He remarks that

"It appears somewhat remarkable that while the Echinoderms, with few exceptions, are common West Indian or Florida species, the corals are nearly all, so far as known, peculiar to the coast of Brazil. This is, however, in accordance with similar facts observed in the Pacific and Indian Ocean, where the greater part of the tropical Echinoderms have a vast range, in some cases even from the Hawaiian Islands to the coast of Africa, while the corals are much more local, all the principal groups of islands having many peculiar forms. This is, perhaps, due to the much longer time during which the young of most Echinoderms remain in the free, swimming condition, liable to be carried great distances by currents."

THE BOOK OF EVERGREENS. By *Josiah Hoopes*. — The author has furnished, under the above modest title, a book than which none could be more needed. Good books are always in demand, and therefore the first paragraph of the preface might have been omitted, or at least so modified, as to be a statement of the author's *claims* to teach concerning the Coniferae, rather than an *excuse* for "intruding his views and experiences upon the public."

Mr. Hoopes has long been favorably known as a successful arboriculturist, and as especially successful in growing the Coniferae. He has, moreover, been a pupil of the late, lamented Dr. Darlington, to whose memory the volume is dedicated. With these guarantees as to his competency, and with the superadded one of enthusiasm in his "specialité" we might reasonably expect something good. The reading proved our expectations to be well founded.

Up to this time no popular work on the subject, and suited to our climate, has been accessible to the American public. We should be unjust to the author, as he is to himself, if we limited its merit to merely supplying a popular want. It is more; for on its pages we find much that is valuable to the man of science, along with some smaller matters, which are open to his criticism. The views of classification expressed may or may not accord with those of Parlatore and Engelmann. Yet all the con-

\* Notice of the Corals and Echinoderms collected by Professor C. F. Hartt, at the Abrolhos Reefs, Province of Bahia, Brazil, 1867. 8vo, pp. 20. Notice of a Collection of Echinoderms, from La Paz, Lower California, with Descriptions of a New Genus. By A. E. Verrill. 8vo, pp. 6. April, 1868. With a plate. (From the Transactions of the Connecticut Academy of Arts and Sciences.)

clusions seem to be based on careful study. In these days of specific doubts and difficulties, it is all important, we think, that the broader views of species be taken. We would have even gone farther than Mr. Hoopes in our reduction of some hitherto accredited species, and we fancy we could, in a few cases, arrange them better under the genera. The goodly number of varieties enumerated shows he has not fallen into the bad habit of giving a new specific name to every sport produced under cultivation. The advice concerning the growth and propagation of Conifers may be considered as authoritative for the Middle United States.

We could wish that more space had been given to the "Insects injurious to Coniferae." The analytical key is clear, and really smoothes the road to the determination of any given species described in the work.

Truth is truth, Mr. Hoopes thinks; and does not need any compromise to make it truer. Such is the spirit in which he claims the acceptance of *Sequoia gigantea* as the proper name for our California giant. The taste which would fill our grounds with imported trees, to the utter exclusion of our native beauties, is, we think, justly censured.

Judd & Co., of New York, have published the book in their best style. It should be in the library of every arboriculturist (whether amateur or professional) in the land.—J. T. R.

THE BUTTERFLIES OF NORTH AMERICA.\*—Such a beautifully printed and finely illustrated work on our Butterflies, as this promises to be, will be opportune to all butterfly hunters as well as entomologists generally. Mr. Edwards brings to this work a thorough knowledge of our Butterflies, and the reader will find much that is new regarding their haunts and habits. In the early numbers the species figured will be mostly new, or if old, those that have been incorrectly described or figured. With Part III. will be commenced a synopsis of North American species, to be completed within the volume. The lithographic plates are beautifully drawn, and the letter-press is all that can be desired. When completed the work will make a most attractive volume. A number, containing at least five plates, will be issued every three months. Figures of both surfaces of the insect are given, and of both sexes wherever possible.

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## NATURAL HISTORY MISCELLANY.

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### BOTANY.

CHOICE NEW VARIETY OF *KALMIA LATIFOLIA*.—Flowers have just been brought to us by Mr. Charles J. Power, florist, South Framingham, Mass.,

\*The Butterflies of North America; with colored Drawings and Descriptions. By Wm. H. Edwards, Philadelphia. Published by the American Entomological Society. Part I, 4to. April, 1888. Price of each part, \$2.00. Subscribers may address E. T. Cresson, 518 South 13th street, Philadelphia, Pa.

of much the most marked and showy variety of the above species which I ever saw, and which, being in cultivation, requires a name. It may as well be named *Var. coronata*, the Crowned Mountain Laurel. The corolla is white, except a broad crown of dark crimson, continuous, but somewhat blotchy, which occupies the whole inside of the cup from the pouches up to near the margin, which again is clear white. A single shrub of this was accidentally discovered two years ago, in bloom in a wood near Framingham, by Mr. James Parker, but was destroyed by fire, the ground having been accidentally burned over. But a branch, given to Mr. Power, was preserved by grafting upon the ordinary form of the species. From this graft, which has now blossomed, it is hoped that this beautiful variety may be abundantly propagated. — A. GRAY.

A WHITE CHOKE-CHERRY. — There is a variety of Choke-cherry (*Prunus Virginiana*) bearing white fruit occasionally found about here. Is it found in other places? — D. W. C. CHALLIS.

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### ZOOLOGY.

SHORE-COLLECTING ABOUT NEW YORK. — Thinking that some of your New England readers, who are of course lovers of Natural History, would be likely to pay a visit to New York, and would be glad to know where, and how to pursue their favorite study, I have been induced to send you a few remarks on the subject. It is scarcely necessary to inform them that New York, like nearly all great commercial centres, is a very poor place to collect specimens in their natural situations, especially marine animals and plants, as the shore is so much in demand for wharves, docks, factories, etc.; and this explains why it is so difficult to procure specimens of shells, corals, etc. from sailors, who only visit large cities, and of course who have neither time nor inclination to walk a great distance in search of them, nor much money to purchase them.

Suppose a stranger in New York who would like to collect shells, Algae, or zoöphytes; there are boats running up the Long Island Sound every day in the summer, and the ferries to Staten Island, but I would advise him to leave the city by the Fulton Ferry to Brooklyn, step into a Greenwood car, and tell the conductor he wishes to go to Fort Hamilton; when he reaches there, walk a short distance to the left past the fort, and his field is before him. One thing he should do before starting is to look in the newspapers and see what hour it is high tide that day, and choose his time as near six hours from that as possible, and so time his visit as to have as much beach as possible, for it would be almost useless to go at high-water. He will immediately notice that the geological formation is somewhat different to what it is on many of the New England shores, being all of the drift formation, — no rocks in place, — all loose boulders, sand, and gravel, so of course there are none of those beautiful natural aquaria full of actinias, algæ, and mollusks in a state of nature; but he may find many shallow pools where many very interesting objects may

be obtained. Of course, the shores have their different seasons, as the land has; for in the month of February the shore is covered with blocks of ice, so that nothing can be obtained; but sometimes in this month and the beginning of March, I have collected some of my handsomest sea-weeds; and we generally find in the coldest months the long fronds of *Laminaria saccharina*, nearly twenty feet long, which are never seen here in the warmer season. It is interesting and worth noticing that the largest marine plants, unlike the terrestrial vegetation, are generally found in the colder parts of the world. We read that our Northwest Territory, Alaska, is famous for producing immense specimens of Algae, as for instance the *Neurocystis Lutkeana* which forms dense forests about Sitka; its stem is often three hundred feet long, and ends in a large air-vessel six or seven feet long, crowned with a bunch of dichotomous leaves, each thirty or forty feet in length. Cape Horn and the Cape of Good Hope also produce immense species of submarine vegetation, in comparison with which ours dwarf into insignificance.

But let the naturalist pay a visit to our shores in July or August, and he will find the waters red with beautiful specimens of *Grinnellia*, *Ceramium*, and *Callithamnion*, and a little later in the season the most beautiful plant we have, *Dasya elegans*, in great variety. This plant is also found in the Mediterranean. Many of our plants are found in Great Britain and Ireland, while some are peculiar to this country.

But let us stroll along the beach, leaving the Algae, and see what shells can be found. *Nassa obsoleta* is the most common; this with *Nassa trivittata*, *Fusus cinerius*, *Natica duplicata*, *Crepidula fornicata*, and two species of *Litorina* comprise nearly all the univalves. We occasionally find dead shells of *Ranella caudata*, *Pyrala canaliculata*, *P. carica*, and a few of the smaller genera, such as *Odostomia* and a small *Cerithium*.

The bivalves mostly consist of *Mytilus edulis*, *Mya arenaria*, *Venus mercenaria*, *Sanguinolaria fusca*, and occasionally, though rarely, *Donax fossor*, *Pandora trilineata*, and *Osteodesma hyalina*. There are a few others found here, but so rarely, that a person might visit the beach a dozen times without seeing them. In the salt meadows, about half a mile from the fort, may be found quantities of *Melampus bidentatus*, and rarely *M. denticula*; here, after crossing a small brook, may be observed at low tide a beautiful proof of the subsidence of the coast of Long Island, for here we find beds of peat, and stumps of trees with their roots spreading in their natural position, showing very plainly, and beyond dispute, that the coast has settled very lately, geologically speaking.

The radiated animals are singularly scarce on this part of the coast. It is very rare indeed that a single specimen can be found of either star-fish, Echinus, or Holothuria; I mean in New York, that is from Coney Island to the city. When we get into Long Island Sound, to the east of the city, we sometimes find a few, though they are not plentiful for many miles off.

It may not be generally known, but I have been assured by ornithologists, that Long Island has produced more species of birds than any other

place in the United States of its size. Entomologists and botanists make the same statement in regard to their respective specialities. The shores from here to the extreme eastern end of the island are mostly protected from the ocean by sand-bars and islands, leaving large bays and salt-meadows, which are the favorite haunts of thousands of aquatic and rapacious birds. Many birds have been shot here this winter that are generally considered as very rare, such as the Labrador duck, the Harlequin duck, the Goss-hawk, and a few others not often seen. On the shores of Coney Island we sometimes find, about the months of February and March, immense quantities of *Macra solidissima* and *Natica heros*. Last March the beach was covered for miles with these shells, especially the former, which was heaped up in beds two or three feet thick. — A. R. Y., Brooklyn.

THE CROW BLACKBIRD A ROBBER. — Three years ago this spring there came into our village a flock of a dozen or more of the common Crow Blackbird (which are plenty in the country above here) for the purpose of building their nests in the tall Lombardy poplars in our streets, and they have been with us each season since, leaving whenever the young can fly. Until this season they have made their nests only in the poplars, selecting places near the trunk, where the clusters of nearly upright limbs secure them from ordinary observation. This spring they have appeared in greater numbers; two pairs have built their nests inside the spire of a church, passing through the openings of an ornamented window high up above the tops of our tallest trees. A bell is in the tower of the steeple below, and is rung at customary times, and a colony of doves is in the section near the bell. The writer has just discovered that the Blackbirds have taken possession of a martin-house in his garden. They are busily engaged carrying in materials for nests, and the martins are flying helplessly about. Also, in the top of the pyramidal trellis covered with vines forming the lower half of the support of the martin-house, a pair are building. It is a place used some years by robins, but the fact was so novel, that instead of driving them off, a new martin-house is to be put up at once, near by, which the martins, in their necessity, will no doubt occupy. The Blackbirds are tame about our streets and gardens, lighting on the ground at the same time with the robins, with much the same habits in this respect, although evidently going beyond the limits of the village for most of their food.

We have robins in large numbers, — small birds being protected by law, — and on the arrival of the blackbirds the first season there was trouble among them, and their note, denoting disturbance, could be heard on every side, and for good reason, for the blackbirds, without so much as saying "by your leave," took the materials from every unfinished or unoccupied robin's nest they could find. But, singularly enough, the blackbirds soon succumbed, and the robins drove them away in all cases of contest; but they seem to live in harmony, and, as I have mentioned, are often in company on the ground seeking for food. — F. W., Newark, N. Y.

NOTES ON THE RED AND MOTTLED OWLS.—In a note to the very interesting paper of Mr. C. J. Maynard, on *The Mottled Owl in Confinement*, in the April number of the *NATURALIST*, Mr. E. A. Samuels alludes to the question as to whether we have two species of *Scops*, or whether the young of *S. asio* are sometimes gray in color and sometimes red, as remaining still undecided. As there is hardly a more interesting or more singular problem in the history of our birds, a brief history of the question, and a short recapitulation of the knowledge we possess on the subject may not be uninteresting.

The Red Owl was described by Linnaeus, in the *Systema Naturæ*, vol. 1, p. 132, in 1766, under the name *Strix asio*. Gmelin, twenty-two years later, described (*Systema Naturæ*, vol. 1, p. 289) the Mottled Owl as *Strix neriæ*. In 1812, Alexander Wilson, in the fifth volume of his admirable, and in many respects yet unsurpassed *American Ornithology*, redescrives the two, under the same names, also as distinct species; and not till 1828 does it appear to have been publicly hinted that the two were really one, when Prince C. L. Bonaparte united them, he considering the red birds as the young, and the gray the old. Audubon, in 1832, sustains this view; one of the red birds he figures as the young, being one he reared from a fledgling, and adds that long before Bonaparte corrected the mistake he (Audubon) attributes solely to Wilson, he, as well as some of his admirers, was well aware of their identity. Nuttall, a few years later, supports the same view. In 1837, Dr. S. Cabot, jr.,\* of Boston, while considering the two birds identical in species, reverses the order, making the red plumage the old, and the gray the young; and in confirmation of his views exhibited, as seemingly conclusive evidence, an old red bird he shot while in the act of feeding some gray young ones, which he also exhibited. In July of the same year Dr. Ezra Michener, in a paper in the *Journal of the Philadelphia Academy of Sciences* (vol. 7, p. 53), entitled *A few Facts in Relation to the Identity of the Red and Mottled Owls*, states that he had seen young Screech Owls, accompanied by their parents after leaving the nest, of both red and gray colors, the parents being always of the same color as the young. "The conclusion is, therefore," he says, "evident, either that the color of both old and young is variable and uncertain, or that they are specifically distinct." The latter opinion he adopts, ignoring the then sole known case of different colors in the young and parent in Dr. Cabot's birds, very positively concluding there are two species, and that Wilson was right.

Dr. P. R. Hoy, in his valuable *Notes of the Birds of Wisconsin*, published in 1853 in the *Proceedings* (vol. 6) of the Philadelphia Academy of Natural Science, gives them as two species, remarking he is "not yet satisfied that the Mottled and Red Owls are specifically the same." He says, under *Scops asio*, "In the month of June I caught four young ones just as they were about leaving the nest. They were of a deep reddish-brown, in all respects similar to the female which I shot at the same time, and have

\* *Journal of the Boston Society of Natural History*, Vol. II, p. 126.

preserved." Mr. John Cassin, in his various papers on the owls, adopts the conclusions of Bonaparte, considering them as one species, and the gray as the adult. He adds, however, referring to the fact of the two stages of plumage having been considered as characterizing two species, that "they do present a problem scarcely to be considered as fully solved." But the opinion that the Mottled and Red Owls are really but one species, is the one now generally adopted by ornithologists.

From the information now at our command on this subject, can we not fully solve the problem? The facts recorded teach us that nestlings and young fledglings occur in both red and gray plumage, in some cases birds of one brood presenting both conditions; that old birds are sometimes gray and sometimes red, both colors being common to both sexes, and that occasionally red males pair with gray females, and the reverse; that the young are sometimes like their parents and sometimes unlike them. These facts hence seem to warrant the following conclusions: first, that these different conditions of plumage do not characterize age; second, that they are not *sexual peculiarities*; third, that they are unusual and irregular variations of plumage of one species. Though such variations are extremely rare, our bird is in this respect not without its parallels in other countries. The best known instance seems to be that of the Brown Owl of Europe (*Syrnium aluco*), which, according to authors, presents similar variations. And they apparently occur in other species of *Scops*.

Considering, then, the Red and Mottled Owls as unquestionably one species, and one diffused widely over the continent, occurring from ocean to ocean, and from Mexico nearly or quite to the arctic regions, have we really a second species of *Scops* in the United States? In 1854, Mr. Cassin, in his *Illustrations of the Birds of California, Texas, etc.*, describes a species of *Scops* from California, Texas, and Mexico, "in form and general characters much resembling *Scops asio*, but smaller," but which he considers new, giving it the name of *Scops Maccallii* (Western Mottled Owl). Its validity as a species distinct from *S. asio* has been questioned by very high authorities, and apparently with very good reasons, its chief and almost only distinction from *S. asio* of the north being its somewhat smaller size. Mr. P. L. Selater, one of the highest authorities on American birds, in remarks (Proceedings of the Zoölogical Society of London, 1857) on a collection of birds from about Oaxaca, in Southern Mexico, mentions an owl under this name, which, though he says it, "certainly has the appearance of *Scops asio*, and is smaller," but does not, he thinks, "quite fit" this species (*S. Maccallii*). Dr. J. G. Cooper, who has collected specimens of the bird in question in Southern Arizona, thinks it scarcely distinct from *Scops asio*. The slight differences in color pointed out by Mr. Cassin are of but little account, while the character of smaller size is either of no, or of negative, value. It is well known now to naturalists who have been at all attentive to the subject, that a diminution in size among birds in species resident over a large area is a constant attendant on decrease of latitudes, so that birds residing at points a thousand miles dis-

tant in latitude are likely to differ markedly in size, while presenting no appreciable differences in other characters. The few cases where this does not apparently occur, are only the exceptions to a general law. Hence we should expect to find the specimens of *Scops asio* collected in Florida, Texas, Mexico, and other southern points, smaller than those of the Northern States and Canada. Before this law was fully recognized—and which the immense collections of birds from widely different parts of this continent, recently brought together at the Smithsonian Institute, under the careful scrutiny of Professor Baird and his co-laborators, have aided immensely to demonstrate—many species were indicated whose chief and not unfrequently only distinction from more northern allies was the character of smaller size, and in this category seems to me to be the true place of *Scops Macallii* Cass.; leaving then but one *Scops*—our well-known Screech Owl—to America north of the tropics.—J. A. ALLEN.

A PERCHING SNIPE.—Mr. W. A. Pope has observed the *Scelopax Wilsonii* in Prince Edwards Island, "sitting on the top of a tree at least thirty feet from the ground."—*Land and Water*.

Have our ornithologists observed this peculiarity in the snipe?

THE DISTRIBUTION OF OUR BIRDS IN THE BREEDING SEASON.—Professor Agassiz has issued a circular, in which he asks for the coöperation of ornithologists in securing specimens of birds and complete local lists, with full notes in reference to the times of their migrations, time of nesting, and relative abundance. A series of specimens of birds of any locality in the Southern and Western parts of the continent, with or without their nests and eggs, with the date and place of collecting carefully noted and appended, are much desired. Specimens may be sent to the Museum of Comparative Zoölogy, Cambridge, Mass.

SALT-WATER INSECTS.—Dr. J. L. Leconte writes us regarding the supposed *Micralymna* larva, mentioned in the July number of the NATURALIST: "Your Staphylinide larva is probably that of *Micralymna Stimpsonii* Leconte (New Species of Coleoptera, Smithsonian Miscellaneous Collections, p. 57). It is much larger than the Greenland species, which is also in my collection. It ought to be common where it occurs." We have received from Professor A. E. Verrill specimens of the "puparium," or pupa-case, of the fly so abundant in Mono Lake, Cal., where it was collected by Professor B. Silliman. It is a species of *Ephydra*, closely allied to that figured (Fig. 4b) in the July NATURALIST, and is not allied to *Eristalis* as was supposed. In this connection we would state that Mr. Horace Mann desires us to say that he himself has not been nearer than ten miles to Lake Mono. He only knows that *some* Indians eat these insects.

Dr. Leconte thus writes regarding another salt-water insect: "In your notes on sea-insects, you do not refer to our singular Californian Staphylinide, *Thinopus*, with two species, found below high-water mark

on the wet sand. From the variegation of pale yellow and black they are singularly Crustacean-like, both in the larval form and in the perfect state."

ENEMY OF THE POTATOE-BUG.—I have seen, for the last few days, many of the western potatoe-bugs, with their larvæ, devouring the tops of the potatoes. I have also discovered an enemy in a bug often found on ripe berries, which has a very unpleasant smell, which belongs to the Cimicidæ, and is called Halys, which sucks the blood of the potatoe-bug.—WM. J. McLAUGHLIN.

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### GEOLOGY.

GLACIAL MARKS IN THE WHITE MOUNTAINS.—Since Mr. Vose's article was in print, he writes us that he has seen on Mount Kearsarge, one-third of the way up in the path, furrows running s. 20° E., and one-half the way up furrows running s. 30° E. Also in Ellis' Valley, about two miles above Jackson, on the east side of the river, close to the road, lines pointing just to the top of Mount Washington. He also found furrows on Mount Chocorua.

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### CORRESPONDENCE.

W. J. M'L., Centralia, Kansas.—The two plants you send are *Pentstemon Cobæa* Nuttall, the Beard-tongue, and which you say "grows on sandy or gravelly ridges in Nemaha county, Kansas, flowering in May and June;" and *Solanum rostratum* Dunal. Regarding the latter, you write that it "is an emigrant from the west. In the year 1860, I saw the first along the roadside and yards about Fort Riley, Kansas, and a few days ago I found several plants growing on and near the railroad track of the Central Branch of the Union Pacific Road. The leaf is much the shape of the common watermelon; flower yellow; the whole plant covered with spines; an annual; a noxious weed, from one to two feet high; much branched."

[We cannot attempt to name plants unless there is a proper botanical specimen sent; that is, the flowers adhering to a bit of the stem, the leaves adhering to another bit (or still better, when the size of the plant will admit of it, a flowering branch, or, in stemless plants, the scape with the root-leaves adhering to its base), and a statement as to how high it grows; whether woody or herbaceous; and whether wild or cultivated.]

W. C. F., Eastham, Mass.—The Turtle which you sent and which you say is the first specimen of the species you have seen on Cape Cod, is the "Musk Turtle," *Aromochelys odoratum* Gray. It is given in Agassiz's work on the Turtles of North America (Contributions to the Natural History of the United States, vol. 1, p. 425; vol. 2, pl. 4, young; pl. 7, eggs), under the name of *Ozotheca odorata* Ag. It has also been placed by the older writers in the genera *Testudo* (when all turtles were placed in that genus), *Cistudo*, *Sternotherus*, *Cinosternum*, *Staurotypus*, and *Emys*. The

specific name of *odorata* has held through the several changes that have been made regarding its generic position, though varieties of it have been described as distinct species by several authors. It is a pretty generally distributed species, ranging from Canada south to the Gulf of Mexico, and west to the Mississippi. In habits it is quite voracious and shy, preferring muddy ponds and rivers, and overflowed meadows, where it can easily hide itself. It is often found covered with a green confer-void growth, which also renders it less likely to be noticed. It has the habit of climbing trees overhanging the water, and basking in the sun, and will drop into the water on the slightest hint that it is observed.

The two insects inclosed were two species of wingless Ichneumon flies; one of them probably belongs to the genus *Pezomachus*. We have several wingless genera, and the genus *Pezomachus* comprises an immense number of species. Mr. E. Burgess informs us that in the pupa state the *Pezomachus* is winged, but that the wings drop off in transforming into the imago state. *Pezomachus* may be known from *Mutilla*, by possessing a harmless sting, which only serves as an ovipositor, and a smaller head, and by its very close resemblance to the winged Ichneumons.

W. H. G., Elmira, N. Y. —The moth you send is one of the Sphinges, *Thyreus Nessus*. It was first described and figured by Cramer, a Dutch naturalist. It is found from Canada and New Hampshire southward. The larvæ of this genus differ from most others of this family, in having a simple tubercle on the tail instead of the usual curved horn, as seen in the Potatoe-worm, *Sphinx Carolina*.

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## ENTOMOLOGICAL CALENDAR.

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During this month the Seventeen-year Locust (*Cicada septendecim* of Linnaeus) has disappeared, and only a few Harvest-flies, as the two other species we have are called, raise their shrill cry during the dog-days. But as this year has been marked by the appearance of vast swarms in the Middle States, we cannot do better than give a brief summary of its history, which we condense from Dr. Harris' work.

The Seventeen-year Locust ranges from South-eastern and Western Massachusetts to Louisiana. Of its distribution west of the Mississippi Valley, we have no accurate knowledge. In Southern Massachusetts, they appear in oak forests about the middle of June. After pairing, the female, by means of their powerful ovipositor, bores a hole obliquely to the pith, and lays therein from ten to twenty slender white eggs, which are arranged in pairs, somewhat like the grains on an ear of wheat, and implanted in the limb. She thus oviposits several times in a twig, and passes from one to another, until she has laid four or five hundred eggs. After this she soon dies. The eggs hatch in about two weeks, though some ob-

servers state that they do not hatch for from forty to over fifty days after being laid. The active grubs are provided with three pairs of legs. After leaving the egg they fall to the ground, burrow into it, seek the roots of plants whose juices they suck by means of their long beak. They sometimes attack the roots of fruit trees, such as the pear and apple. They live nearly seventeen years in the larva state, and then in the spring change to the pupa, which chiefly differs from the larva by having rudimentary wings. The damage the larvæ and pupæ do, then, consists in their sucking the sap from the roots of forest, and occasionally fruit trees.

Regarding its appearance, Mr. L. B. Case writes us (June 15) from Richmond, Indiana: "Just now we are having a tremendous quantity of locusts in our forests and adjoining fields, and people are greatly alarmed by them; some say they are Egyptian locusts, etc. This morning they made a noise, in the woods about half a mile east of us, very much like the continuous sound of frogs in the early spring, or just before a storm at evening. It lasted from early in the morning until evening." Mr. V. T. Chambers writes us that it is abounding in the vicinity of Covington, Kentucky, "in common with a large portion of the Western country." He points out some variations in color from those described by Dr. Fitch, from New York, and states that those occurring in Kentucky are smaller than those of which the measurements are given by Dr. Fitch, and states that "these differences indicate that the groups, appearing in different parts of the country at intervals of seventeen years, are of different varieties." A careful comparison of large numbers collected from different broods, and different localities, and different years, would alone give the facts to decide this interesting point.

Regarding the question raised by Mr. Chambers, whether the sting of this insect is poisonous, and which he is inclined to believe to be in part true, we might say that naturalists generally believe it to be harmless. No hemiptera are known to be poisonous, that is, have a poison-gland connected with the sting like that of the bee, and careful dissections by the eminent French entomologist, Lacaze-Duthiers, of three European species of Cicada, have not revealed any poison apparatus at the base of the sting. Another proof that it does not pour poison into the wound made by the ovipositor is, that the twig thus pierced and wounded does not swell, as in the case of plants wounded by Gall-flies which secrete an irritating poison, giving rise to tumors of various shapes. Many insects sting without poisoning the wound; the bite of the mosquito, black-fly, flea, the bed-bug, and other hemipterous insects, are simple punctured wounds, and to a perfectly healthy constitution they are not poisonous, though they may grievously afflict many persons, causing the adjacent parts to swell, and in some weak constitutions induce severe sickness. Regarding this point, Mr. Chambers writes:

"I have heard—not through the papers—within a few days past of a child, within some twenty miles of this place, dying from the sting of a Cicada, but have not had an opportunity to inquire into the truth of the story, but the following you may rely on. A negro woman in the employment of A. V. Winston, Esq., at Burlington, Boone County, Ky., fifteen miles distant from here, went barefooted into his garden a few days since, and while there was stung or

bitten in the foot by a Cicada. The foot immediately swelled to huge proportions, but by various applications the inflammation was allayed, and the woman recovered. Mr. Winston, who relates this, stands as high for intelligence and veracity as any one in this vicinity. I thought on first hearing the story, that probably the sting was by some other insect, but Mr. Winston says that he saw the Cicada. But perhaps this proves that the sting is *not* fatal; that depends on the subject. Some persons suffer terribly from the bite of a musquito, while others scarcely feel them. The cuticle of a negro's foot is nearly impenetrable, and perhaps the sting would have been more dangerous in a more tender part."

We figure the Hop-vine Moth and the larva (Fig. 1) and pupa, which abound on hops the last of summer. Also, the *Mythia colonella* (Fig. 2; a, pupa), known in England to be a parasite of the Humble-bee. We have frequently met with it here, though not in Humble-bees' nests. The larvæ feed directly upon the young bees, according to Curtis (Farm Insects). The Spindle-worm Moth, *Gortyna zea*, whose caterpillar lives in the stalks of Indian corn, and also in dahlias, flies this month. The withering of the leaves when the corn is young, shows the presence of this pest. The beetles of various cylindrical Bark-borers and Blight-beetles (*Tomicus* and *Scolytus*) appear again this month. During this month the Tree-cricket, *Acanthus niveus* (Fig. 3), lays its eggs in the branches of peach

Fig. 1.



Fig. 2.



trees. It will also eat tobacco leaves.

We figure (Fig. 4) the moth of *Eudalimia subsignaria*, the larva of which is so injurious to shade trees in New York City. It is a widely diffused

Fig. 3.

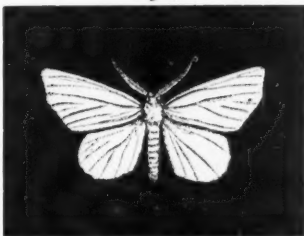


species, occurring probably throughout the Northern States. We have taken the moth in Northern Maine. We have received from Mr. W. V. Andrews the supposed larvæ of this moth. They are "loopers," namely,

walk with a looping gait, as if measuring off the ground they walk over,

whence the name "Geometers," more usually applied to them. They are rather stout, brown, and roughened like a twig of the tree they inhabit, with an unusually large rust-red head, and red prop-legs, while the tip of the body is also red. They are little over an inch long. The supposed "Tortrix" larva, referred to in the Calendar for June, is the Gartered

Fig. 4.



Plume-moth, *Pterophorus periscelidactylus* of Fitch. We were able to raise the moth from larvæ forwarded by Mr. Read. It appeared in one rearing-box June 26. Its habits are very fully described in the first report of Dr. Fitch on the Injurious Insects of New York.

A word more about the Seventeen-year Cicada. Professor R. Orton writes us from Yellow Springs, Ohio, that this insect has done great damage to the apple, peach, and quince trees, and are shortening the fruit crop very materially. By boring into twigs bearing fruit, the branches break and the fruit goes with them. "Many orchards have lost full two years' growth. Though the plum and cherry trees seemed exempt, they attacked the grape, blackberry, raspberry, elm (white and slippery), maple, white ash, willow, catalpa, honey-locust, and wild rose. We have traces of the Cicada this year from Columbus, Ohio, to St. Louis. Washington and Philadelphia have also had a visitation."—A. S. P.

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## PROCEEDINGS OF SCIENTIFIC SOCIETIES.

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LONG ISLAND HISTORICAL SOCIETY, *Natural History Section*. Brooklyn, N. Y.—At a May meeting, a paper was read by Mr. E. Lewis, jr., on "Evidences of Coast-depression along the Shores of Long Island." It is found, by a series of observations made by Mr. Lewis and others, that large areas, known to have been formerly meadow swamp and woodland, are now permanently beneath the water. Some important changes have taken place along the flat shores within historic times. Remains of swamps with fresh-water vegetation are abundant, from four to nine feet below the surface of the meadows, along the southern side of the island, in the bay which intervenes between the beach and the uplands. In one instance roots of swamp vegetation, fast where they grew, were found quite near the beach, under ten feet depth of water. Stumps of the White, or Swamp-cedar (*Cupressus thyoides*), occur in great numbers, fast in the peaty meadows and salt marshes, which are now permanently covered with salt-water. Near Fort Hamilton are the Dyker Meadows, so-called, which extend inland nearly three-fourths of a mile. The upper end is a fresh-water swamp, with cedar and other trees. Where the tides overflow the trees are dead, many of them still standing. Lower down, or nearer the bay, stumps only remain; these abound in the meadows, and are in a good state of preservation. These meadows extend beneath the bay; and one-fourth of a mile from the shore-line, stumps of the cedar, from two feet to three feet in diameter, have been found. It is probably continuous with similar meadows on the opposite side of the river.

A general invasion of the beach along the coast has occurred within historic time; it having been thrown inland, submerging the meadows. From this cause large masses of old meadows are often torn up by waves

outside the beach. There is evidence that the great bay, extending from near I slip to Bellport, was formerly a fresh-water swamp, from which streams of considerable size emptied into the ocean. It is now a shallow bay, in which, about a century since, were great numbers of stumps; the fresh-water and upland vegetation having been destroyed by the invasion of the tides. A line of fence-posts near Southampton, along the shore of the ocean, were exposed a few years since by an extremely low tide which followed a violent storm. These had been buried with sand and covered with water not less than a century, and the line was found to correspond with early surveys of the town. Submerged meadows are found in many places on the north shore of Long Island. A few miles east of Fort Jefferson, it extends half a mile from the shore, is solid, compact, and lies in places sixteen feet below the surface of the water at low tide. A general wearing away and undermining of the headlands around the island has long attracted attention. In constructing the Erie Basin, near Red Hook, New York Bay, Mr. G. B. Brainerd, engineer, found the following series of deposits. The measurements were taken at various points where the water was ten feet deep at low tide.

1. Two feet of mud,—ordinary sediment of the bay.
2. One foot of yellow sand.
3. Six inches of aluminous deposit, quite hard.
4. Ten feet of *compact decayed peaty meadow*.
5. Layer of extremely hard micaceous clay and sand, beneath which was found mud, rather soft, but the depth and character of which was not determined.

During the summer of 1867, John Nadir, U. S. Engineer at Fort Hamilton, carefully examined the underlying formation around Fort Lafayette, for the purpose of determining whether it would admit of the erection upon it of heavier walls. By a series of borings, the earth was penetrated to the depth of fifty-three feet, at points between 800 and 1,000 feet from the shore, where there was ten feet depth of water at low tide. The deposits were as follows:

1. Twenty feet of coarse sand and gravel, with a few broken shells.
2. Three feet of *decayed marsh or meadow*, with diatomaceæ and spiculæ of sponges and shells.
3. Seventeen feet of gravel and sand, with many broken shells.
4. Thirteen feet of mud, quite compact, which appears to have been a marsh with scanty vegetation, rather than a meadow. The vegetable remains brought to the surface by the sand-pump are bits of cedar, and fragments of what appears to be salt-marsh grass, but too much decayed to be fully identified. In this formation great numbers of shells were found and identified by Mr. A. R. Young, Conchologist of the Section, as belonging to species now common on this coast. Most of the specimens are in an excellent state of preservation. Among them are *Nassa obsoleta*, *Anomia ephippium*, *Mya arenaria*, *Crepidula fornicata*, *Solen ensis*, and *Mytilus edulis*. It may be stated in this connection that similar de-

posits, at corresponding depths, have been found on the opposite side of the river in the vicinity of Fort Wadsworth.

The investigations made on the Long Island shores, confirm the conclusions arrived at by Professor G. H. Cook, in his report on the Geology of Cape May county, N. J., that the oscillation of land on this coast during the last epoch has been one of subsidence. If the formation found near Fort Lafayette be, as it evidently is, an ancient marsh, the depression has been at least fifty-three feet.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE. *Seventeenth Annual Meeting, at Chicago, August, 1868.*—The objects of the American Association for the Advancement of Science are, by periodical and migratory meetings, to promote intercourse between those who are cultivating science in different parts of North America; to give a stronger and more general impulse, and a more systematic direction to scientific research in our country, and to procure for the labors of scientific men increased facilities and a wider usefulness.

The seventeenth meeting of the Association will be held at Chicago, during the week commencing on Wednesday, August 5, 1868, at 10 o'clock, A. M.

It will be the aim of the Local Committee to make the sojourn of the members of the Association in Chicago pleasant, as well as profitable in a scientific point of view. The usual local courtesies will be extended to them, both by private citizens and public bodies. Resolutions of invitation, and offers of the use of rooms, libraries, collections, etc., have already been passed by the Academy of Sciences, the Historical Society, the Young Men's Association, the University of Chicago, the Board of Trade, and other bodies.

With the view of insuring as large a meeting as possible, special attention has been given to the facilities for coming to and returning from the city over all routes of travel. Arrangements have been made with the railroad companies, by which return tickets will be furnished free to those who attend the meeting. Doubtless the same concession will be granted by the proprietors of some of the steamboat lines.

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#### BOOKS RECEIVED.

- Observations on Crania.* By Jeffries Wyman, M. D. Boston, 1868. 8vo, pp. 34.  
*Monograph of the Alcide.* By Elliott Coues, M. D. Philadelphia, 1868. 8vo, pp. 31.  
*List of Birds collected in Southern Arizona.* By Dr. E. Palmer; with remarks by Dr. Elliott Coues. Philadelphia, 1868. 8vo, pp. 4.  
*The Portland Catalogue of Maine Plants.* Published by the Portland Society of Natural History. Portland, 1868. 8vo, pp. 12.  
*Popular Journal of Natural History.* Third series, vol. 4, no. 4 (and extra number); vol. 5, no. 1, 2, 8vo. Copenhagen, 1868.  
*The Gospel in the Trees.* By Alexander Clark. Philadelphia, 1868.  
*Cosmos.* April 25, May 16, 23, 30, June 6. Paris.  
*The Field.* May 23, 30, June 6, 13, 20. London.  
*The American Bee Journal.* June. Washington, D. C.  
*Chemical News.* June. New York.

